American Machinist

MAY 28, 1951

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Giant vertical-bar boring machine—see page 2

LARGE BORING MILLS

drudgery is OUT OF DATE

– because Heald Machines have smoothed the way to better production

● In yesterday's factories, precision and mass production were unheard of. But today, these same factors are essential elements of our modern industrial set-up. Let's take a look at just one, for instance.

The modern electric ironer — like so many other labor-saving household appliances — is made *better* and at *lower cost* because essential parts are finished on Heald machines. For Heald has consistently set the highest standards for quality, speed and economy in borizing, internal grinding and surface grinding.

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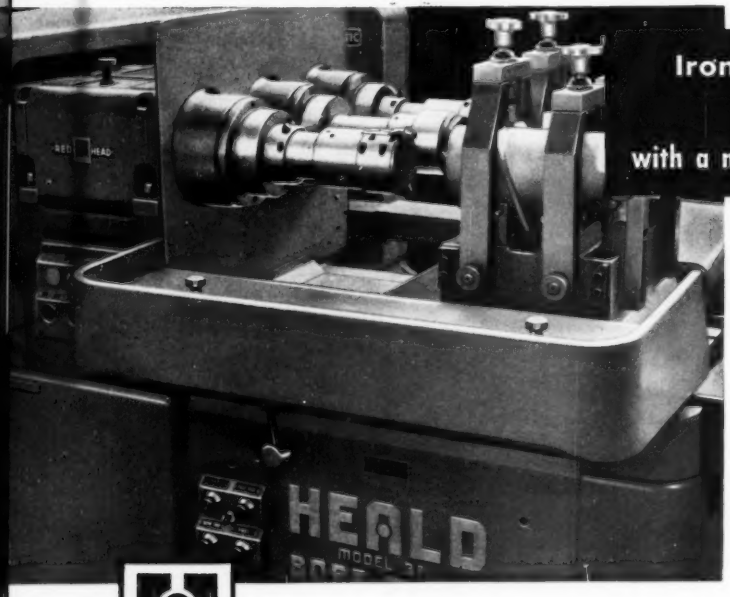

Ironer Cylinders Produced *67% FASTER* with a new Heald Model 321 Bore-Matic

in this case HERE'S WHY

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2. Ease of operation — convenient control grouping, proper working height, push-button operation.
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Chips and QUIPS

No Sag ... To avoid problems within long boring bars in boring generator frames, GE engineers worked out this vertical-bar boring machine. Built by Consolidated Machine Tool Co., the machine is really a 13-ft boring mill set in a pit, with a 22-in. boring bar 35 ft long bolted upright in the center of the table. To judge its size; the columns are 24 ft tall, and the white patch is a cross-section drawing about 18 in. square. The interesting box on top is the electro-magnetic control for the indexing head, accurate to 2 sec of arc.

Machining time was cut two thirds by upending frames rather than boring them horizontally. We asked Messrs Martinson and Quinn (see biogs) to describe this unique machine tool. The Kodachrome was taken by Jim Burns.

Plain Spoken ... Some months ago, when Executive Editor Tangerman addressed the Newark (N. J.) chapter of the ASTE, one member passed on the tip that Otis Elevator had an interesting planer installation at Harrison, N. J. We investigated, and found it was just that. Special Walker magnetic chucks hold elevator guide rails for planing, cutting machining time in half and labor a third. Two quick pages show how.

More Boring ... M. M. McCall, of Niles Tool Works, has put together an unusual story of boring-mill manufacture, erection and use, with the big new unit for Allis-Chalmers as one example. We bring it to you as a picture presentation, with the story of the new GE machine to make almost a Special Report on large vertical boring mills.

Little Brushes ... IBM needs brushes of wire only 0.008 in diameter—with ends ground to shape and heat-treated. To make them, engineers there designed and built their own equipment. Operators merely load, other operations being automatic. For details, see our lead.

Casting Tools ... Major reason for investment castings is precision. To attain —or retain—accuracy, tools for finishing such castings must be carefully designed. Our Special Report in this issue tells how to make them, illustrates some successful designs.

Tooling ... Emphasis in this issue is on tooling, with eight major articles on some phase of the subject. In addition to those separately mentioned, we have the fourth in our series of *very* progressive dies from Volkert, this one on a unit that draw-folds a split cup. Pretrimming the blank with developed notches allows room for metal to flow so six spring-like prongs are produced in the cup wall ... We've also asked our Detroit Editor, Chester Ricker, to put together the data on solid carbide saws, about which we've had many questions since we first mentioned their applications a year ago. He's told the story with sketches of slotting and sawing jobs in metals and plastics, showing clean cutting, non-distortion between kerfs, and long tool life ... There's also a simple broaching fixture.

Coming ... *AM* for June 11 again is packed with newsy technical stories. There's a Special Report on working titanium and its alloys, giving the best that's known up to now. There are stories on fiber-glass laminates in aircraft tooling, on a progressive die for tiny cups, on a hydrofluoric acid pickle to increase tool life, on drilling, on reaming, on carbide burs—and two non-tooling stories, one on small-shop methods, the other on getting watts to work.

METHODS MAN ... A. Martinson was born in Ridgeway, Pa., and went to high school there, continuing his schooling at night thereafter. He joined General Electric as a layout man in the Turbine Div. in 1923, later becoming foreman in the boring-mill section, then asst gen foreman in the Schenectady Turbine Div. In 1942, he was named general foreman in the Syracuse Turbine Factory, and in 1945 returned to Schenectady as asst gen foreman in the Turbine Division. In 1949, he was appointed methods and equipment specialist there. As such, he collaborated in design of the vertical-bar machine with ...

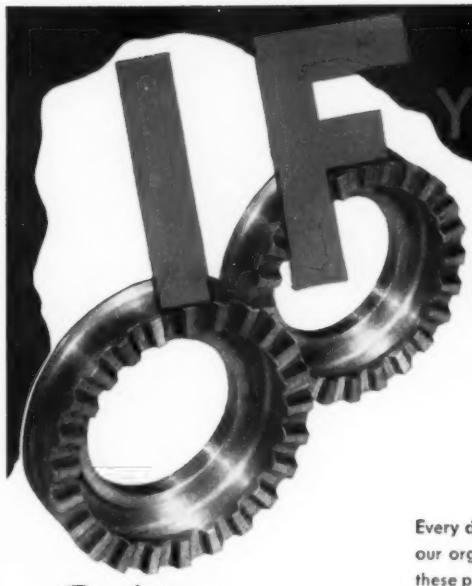
J. G. Quinn, Mr. Martinson's co-author, was born in Scranton, Pa., graduated from high school in Pittston, Pa., then returned to University of Scranton. During World War II, he served 3 years in the Navy, 1½ of them as a radar technician aboard a carrier in the Pacific. Afterward, he returned to college, receiving his BSME in 1947. He joined GE in 1947 in the Rotating Engrg Program, working in the Gen. Engrg Lab Mechanical Div. He is now a development engineer there, working on electromagnetic gages and positioning devices. He is a member of Tau Beta Pi.

IF YOUR PROBLEM IS

BEVEL GEAR OR CURVIC COUPLING DESIGN

MANUFACTURING EQUIPMENT

PRODUCTION TIME AND COSTS

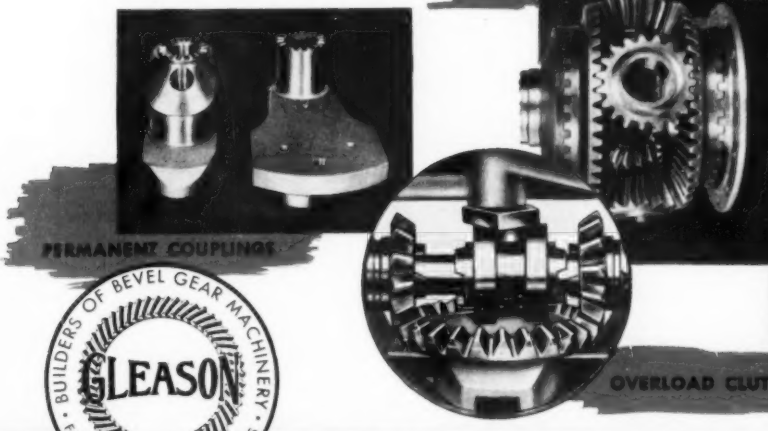


To help you . . .

THE DESIGN ENGINEER should provide us with preliminary layouts or prints of proposed bevel gear designs . . . type of drive, horsepower and speed . . . type of loading (constant, intermittent or shock) . . . type of material . . . driving member and direction of rotation.

THE PRODUCTION ENGINEER should furnish blue prints, material specifications, manufacturing tolerances . . . quantity of gears to be produced . . . number of working hours available for production.

Every day highly skilled engineers within our organization provide the answers to these problems. Backed by the company's 85 years' experience in this field, our complete engineering service is at your disposal, without obligation, to study any bevel gear or Curvic coupling design problem you may have. We will be glad to make our recommendations as to the best design, the proper equipment and the most advantageous methods for reducing production time and costs.



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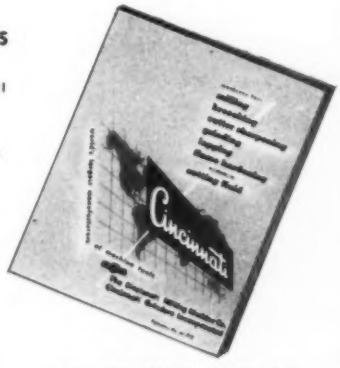

Our new general catalog No. M-1712 contains information and specifications for all machines in the Cincinnati line. A copy will be sent on request.

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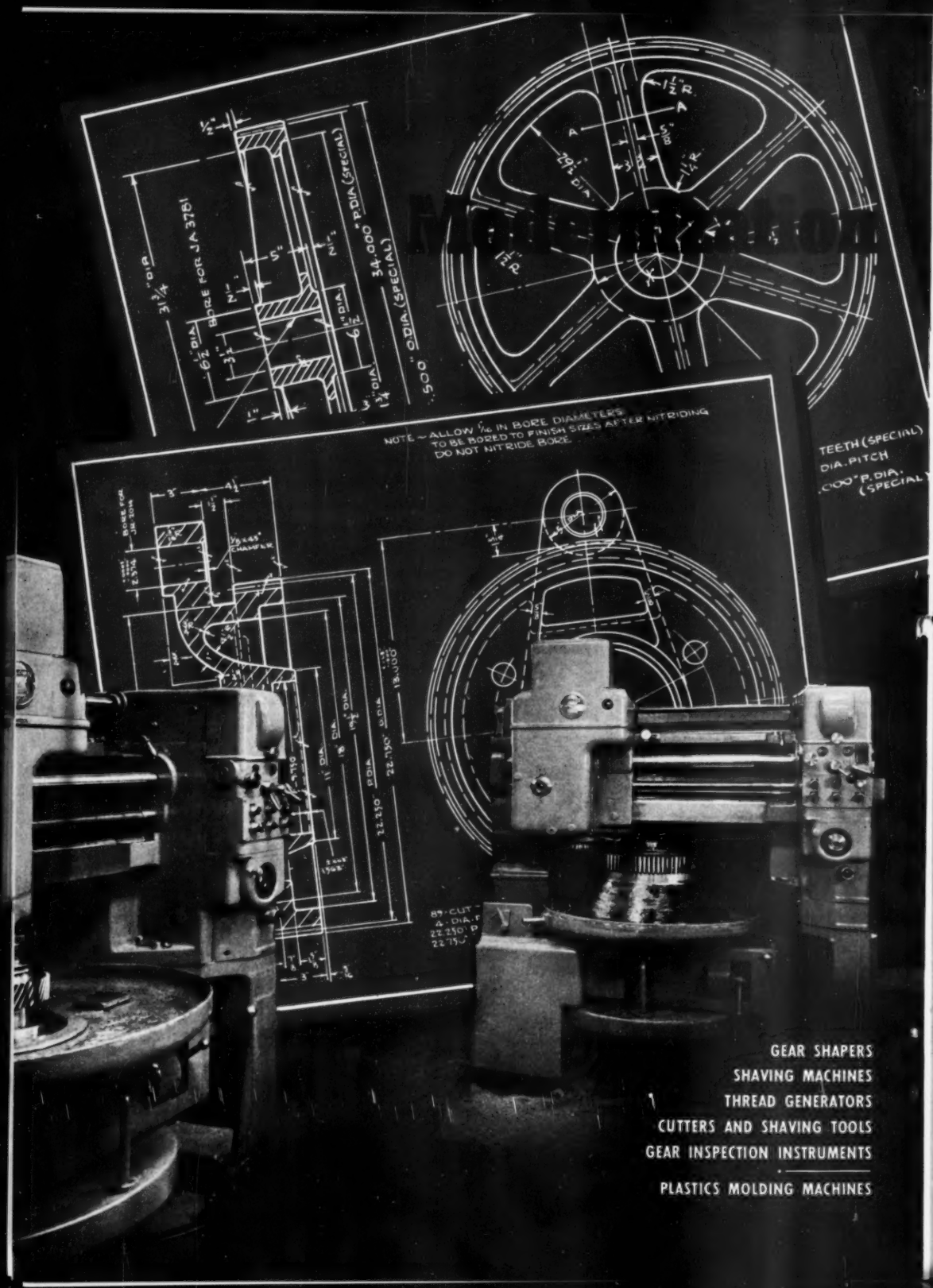
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.500" O.DIA (SPECIAL)
TEETH (SPECIAL)
DIA. PITCH
.000" P. DIA. (SPECIAL)

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Today's demand for quiet, accurate operation must raise the sights of all producers of gears and component gear parts. To meet precision limits in large diameter coarse-pitch gears, modern production equipment such as the all-purpose 36-Type Fellows Gear Shaper, is required.

Recently, one manufacturer replaced 5 outmoded machines with two (2) 36-Type Gear Shapers. The result—better, more accurate gears and, most important, a substantial boost in overall production.

Cost saving is obvious (as shown in the time-performance chart at right) as the result of ability to take heavy cuts at high speed and hold to close limits. Greater flexibility for handling a variety of work is present, along with improved ease of set-up, operation, and 'Change-over'.

If you've a job of precision gear manufacture up to 36" pitch diameter where cost economy and quality of output is important...a thorough investigation of the Fellows 36-Type Gear Shaper is worthwhile. Simply contact the nearest Fellows Office.

Production Performance

LARGE BRONZE GEAR (Top)

Material	High tensile bronze #3
Face width	4 inches
Pitch diameter	34.000 inches
No. of teeth	138
Diametral pitch	4
Former Production Time	6 hours
vs.	
Production Time on 36-Type Gear Shaper	**1 hr., 55 min.**

STEEL SPUR GEAR

Material	Steel casting DW-19
Face width	3 inches
Pitch diameter	22.250 inches
No. of teeth	89
Diametral pitch	4
Former Production Time	10 hours
vs.	
Production Time on 36-Type Gear Shaper	**2½ hours**

PHOTOS AND PRODUCTION DATA COURTESY SAMUEL M. LANGSTON COMPANY, CAMDEN, NEW JERSEY.

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Rugged adjustable cutterhead permits horizontal, vertical or angular milling . . . all on ONE machine . . . with standard tooling.

• EASE OF OPERATION
Finger-tip front and rear control of all power feeds. . . . Front and rear 6-way rapid traverse. . . . Large easy-to-read graduated dials. Aluminum alloy arbor supports for easy handling.

• SIMPLICITY OF CONTROL
All power feed controls are DIRECTIONAL — operate in direction of desired table, saddle and knee movement. . . . Rotary-type feed selector. . . . Convenient and accessible speed selector.

• INCREASED RANGE
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• LONG LIFE
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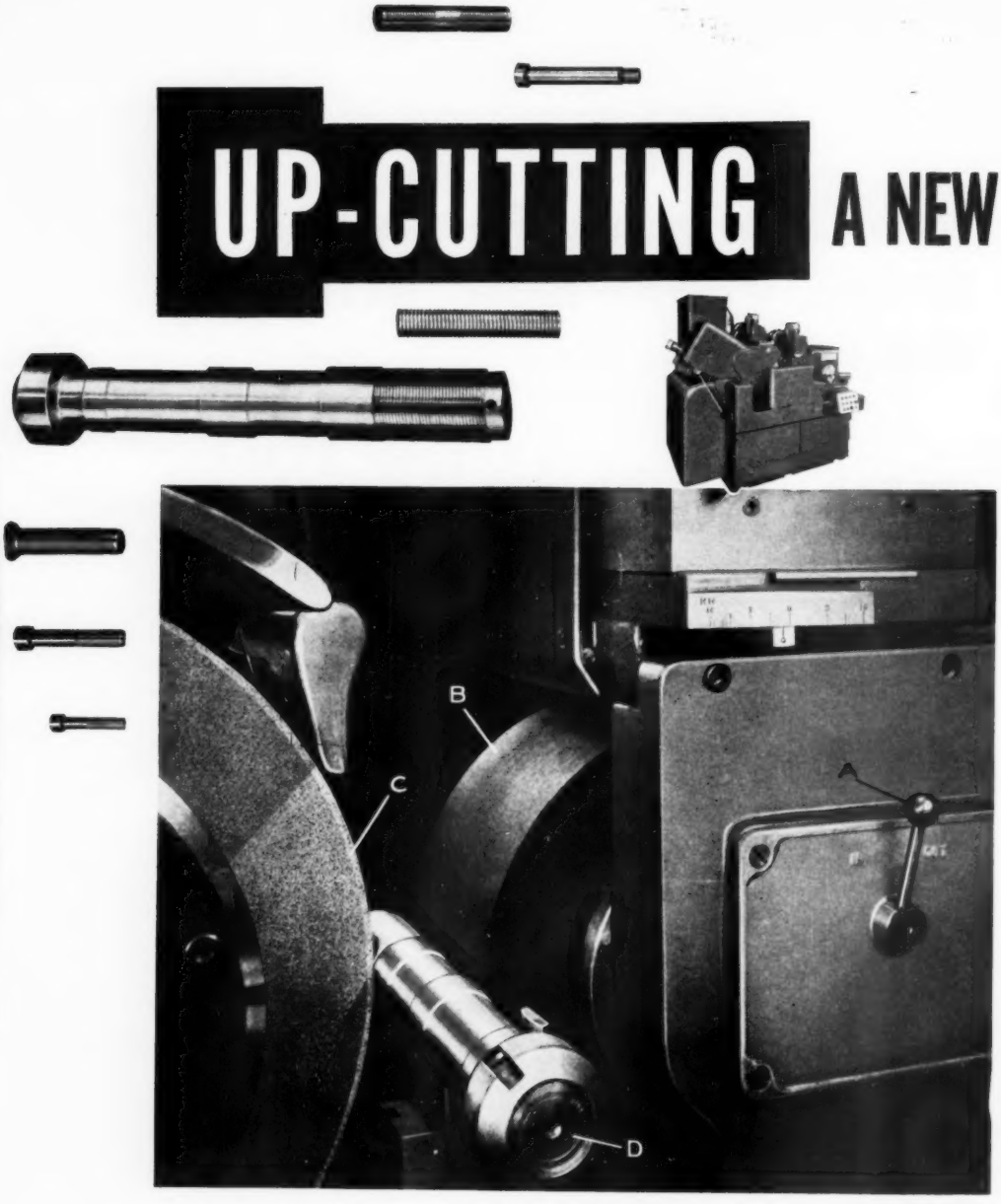

A—Infeed Control Lever; B—Regulating Wheel; C—Grinding Wheel; D—Diesel Engine Bolt.

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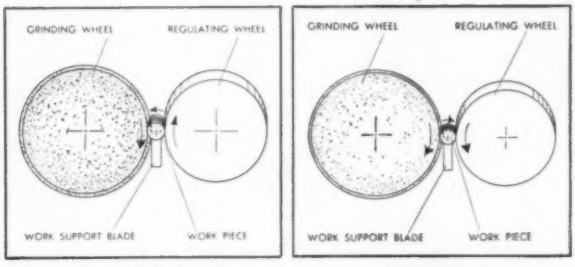
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD

Centerless Thread Grinding TECHNIQUE

GREATER WORK SURFACE SPEED — BETTER THREAD FINISH

• Engineering research in our laboratories has developed a revolutionary new technique in centerless thread grinding—"up-cutting." The difference between "up-cutting" and "down-cutting," the method generally used for centerless cylindrical grinding and centerless thread grinding, is illustrated diagrammatically below. The new technique is generally to be used for infeed grinding and for large workpieces requiring coarse-pitch threads.

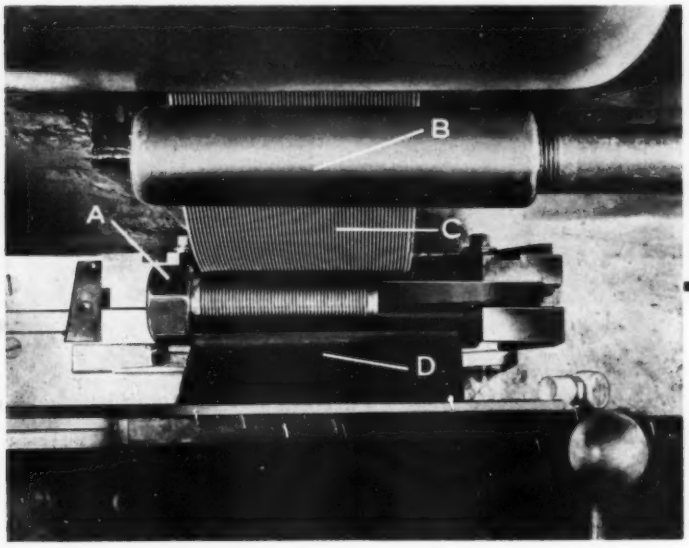


DOWN-GRINDING UP-GRINDING

In "down-cutting," the surfaces of the workpiece and grinding wheel move in the same direction at the point of contact. In "up-cutting," the surfaces of the workpiece and grinding wheel move in opposite directions at the point of contact. Stresses imposed are reduced and work surface speeds can be used up to 30% greater than for similar "down-cutting" conditions, with fewer wheel dressings. All forces act downward, holding the workpiece firmly on the workrest blade and reducing chattered finishes under heavy cuts. The regulating wheel solely controls work rotation and the end-wise travel in timed relation to its rotation, completely independent of friction between the grinding wheel and the workpiece. Spinning of the work is practically eliminated, especially when grinding coarse threads on heavy workpieces.

Write for Bulletin E-97

A—Hex-Head Cap Screw; B—Coolant Nozzle; C—Grinding Wheel; D—Regulating Wheel.



WAYNESBORO PENNA. U. S. A.

GENERATING EQUIPMENT

IMPROVED LANDIS TOOL GRINDING METHOD

by grinding TWO diameters in ONE operation

LANDIS TOOL 10" x 36" Type CH Plain Grinder with special tooling:

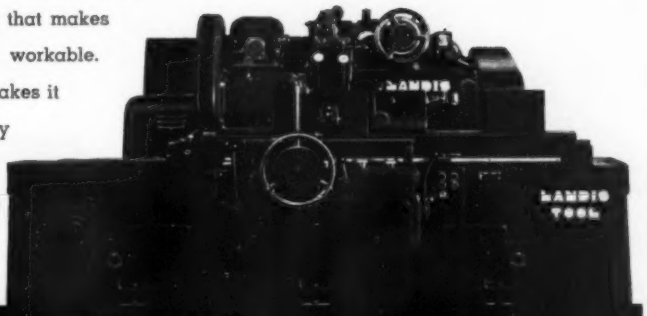
❶ **LATERAL LOCATOR** to prevent grinding wheel from striking flange on rapid infeed.

❷ **DOUBLE DIAMOND HOLDER** allows operator to dress both wheels at once in exact relation to each other.

LANDIS TOOL COMPANY / WAYNESBORO, PA. / U. S. A.

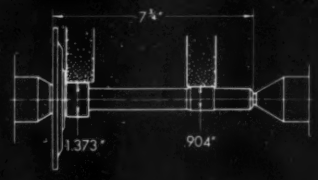
STEPS UP PRODUCTION 74%

LANDIS TOOL EXTRA DIAMETER WHEEL SPINDLE provides the rigidity that makes this spaced wheel assembly workable. Minimum spindle deflection makes it easier to maintain concentricity and finish of two diameters because both are ground at the same time.



NEW METHOD

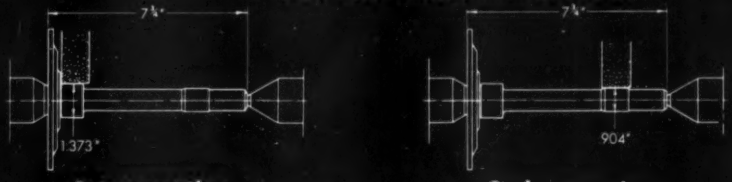
Production—125 Complete Shafts Ground Per Hour



Stock removal .003" to .012"
Finish 15 micro inches maximum
Limits .0005"

OLD METHOD

Production—72 Complete Shafts Ground Per Hour
Same stock removal, finish and limits



1st operation — 2nd operation

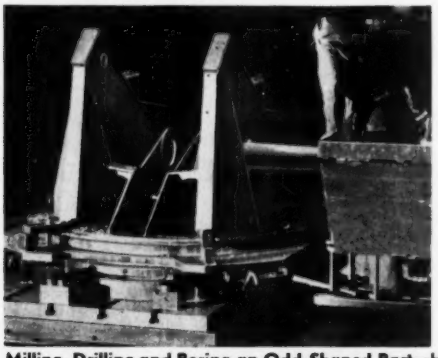
128

If you have a precision grinding problem, we will make recommendations and production estimates on the basis of your blueprints.

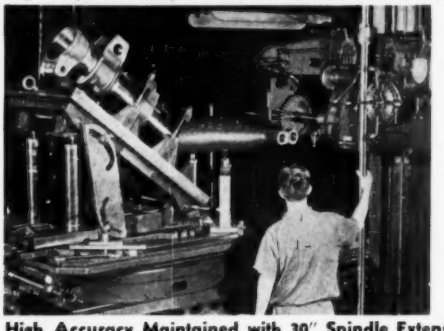
LANDIS TOOL
Precision Grinders

SOLVE ★ ★ QUICKLY ★

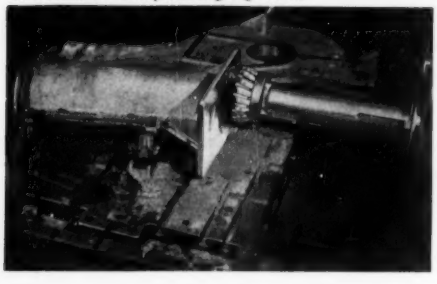
Machining 33 Pads and 9 Holes in One Work Setting—Steel *weldment for gun mount* is indexed four times on rotary table while 25 rough and finish facing and boring operations are performed. Face mills, boring bars and an angular milling attachment are employed in efficient sequence.

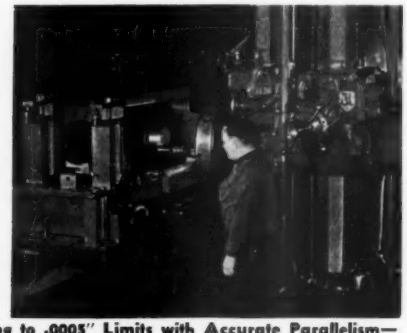


Milling, Drilling and Boring an Odd-Shaped Part—Hard-to-hold *aircraft landing gear cylinder* is mounted and precision machined on a G. & L., using three standard attachments. Only one work setting is required to mill, drill and bore trunnion and trunnion units.

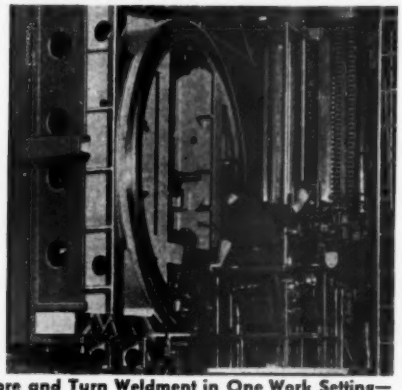


High Accuracy Maintained with 30″ Spindle Extension—Non-sparking copper silicon *ammunition hoist component* for a war vessel has a projection which requires face milling with machine spindle extended 30″. G. & L. rigidity permits holding dimensions within 0.002″ and producing high finish.





Turning to .0005″ Limits with Accurate Parallelism—*Breech chamber for an artillery piece* is too heavy and awkward to rotate on a lathe. This G. & L. equipped with a continuous feed facing head finishes the trunnion to .0005″ limits, holding close parallelism. The flange is faced in the same work setting.

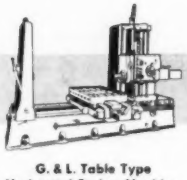


Mill, Bore and Turn Weldment in One Work Setting—Large, heavy *weldment for naval twin gun mount* is held on vertical rotary table for milling a circular surface, interrupted by a protrusion. Other surfaces are turned, milled and bored in the same work setting.

GIDDINGS & LEWIS

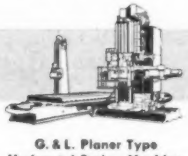
FOND DU LAC

G&L HYPRO



G. & L. Table Type Horizontal Boring Machine

G. & L. Floor Type Horizontal Boring Machine



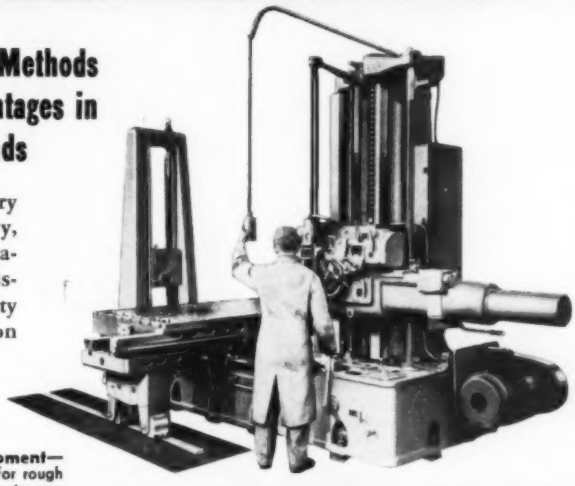
G. & L. Planer Type Horizontal Boring Machine

ARMAMENT MACHINING PROBLEMS

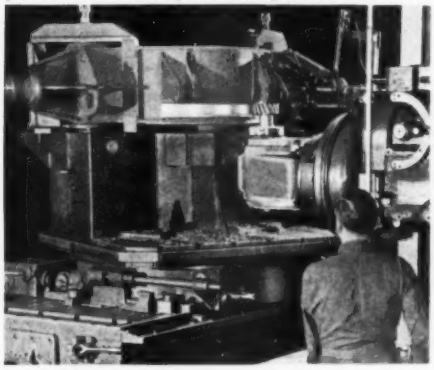
★ ACCURATELY ★ ★ ECONOMICALLY ★

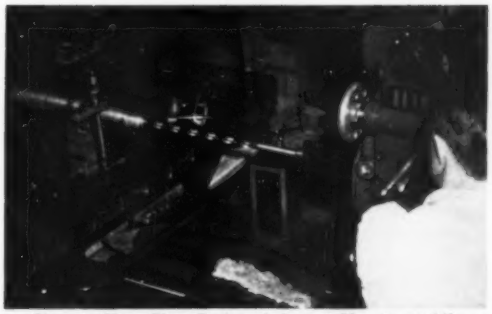
These Advanced G. & L. Production Methods Offer Practical, Time-Saving Advantages in Meeting Today's Urgent DO Demands

G. & L. machines efficiently handle ordinary equipment components as well as heavy, unwieldy, odd-shaped castings and fabrications. Operations are performed successfully on single pieces, short runs and quantity production. Here are some typical jobs on parts for armament purposes:



Radial Surfaces Machined with Standard Equipment— *Howitzer bottom carriage* is mounted on a rotary table for rough and finish ledge cuts; rough, semi-finish and finish radius cuts; one chamfer and one slotting clearance cut. Angular milling attachment positioned with cutter up for these operations.

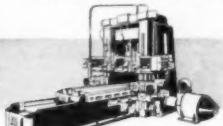




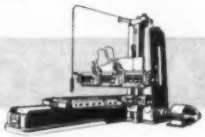
Floor-to-Floor Time Reduced from 2 Hrs. to 32 Min.— *Shell forging punch* of chrome-moly tool steel is drilled on a G. & L. in slightly over 25% of the time required when using another type of machine tool. The part is held in a special fixture mounted on the machine table.

MACHINE TOOL COMPANY

WISCONSIN, U. S. A.

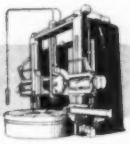


Cincinnati Hypro Double Housing Planer



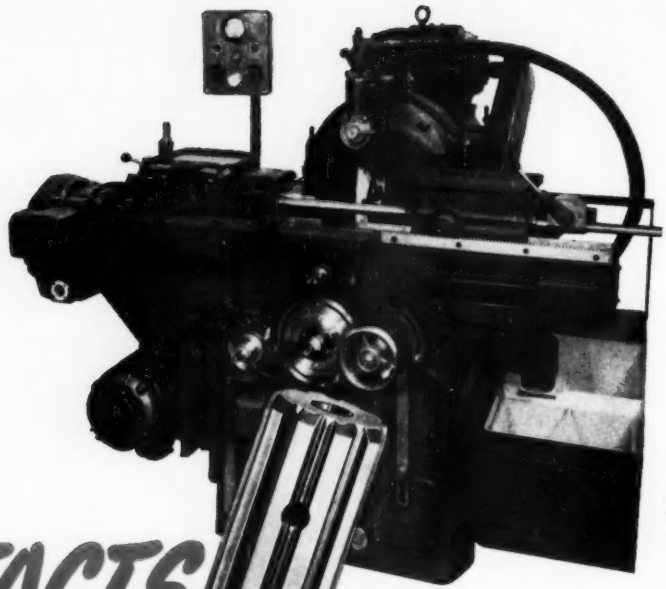
Cincinnati Hypro Openside Planer

Cincinnati Hypro Planer Type Milling Machine



Cincinnati Hypro Vertical Boring and Turning Mill

DAVIS Complete Tooling Service



6" x 15" Jones & Lamson Automatic Thread Grinder.

FACTS on improving production!

80 PIECES PER HOUR!
(CLASS IV THREADS)

The New Process Gear Corporation, Syracuse, N.Y., installed a Jones & Lamson Automatic Thread Grinder to grind Class IV threads on main drive pinions. The threads are ground from the solid, after the piece has been completely machined (including the keyway in the thread diameter) and hardened.

This is how their investment paid off:

PRODUCTION: 80 CLASS IV THREADS PER HOUR
SCRAP REDUCED 50%
SUBSTANTIAL SAVINGS IN DIRECT LABOR COSTS, OVERHEAD AND GAGE COST.

In addition to better quality threads and more uniform finish J&L Automatic Thread Grinders:

- reduce handling costs
- eliminate costly rethreading after heat treatment
- eliminate expensive retooling when specifications change
- reduce the cost of gage maintenance

Now, more than ever, the most efficient machines and methods are needed to make the most of your available manpower and material. Jones & Lamson is ready, willing and able to help you get maximum results from your turning, threading and inspection operations. Write *today* to Department 710.

Turret Lathes—Fay Automatic Lathes—Thread Grinders—Optical Comparators—Threading Dies

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

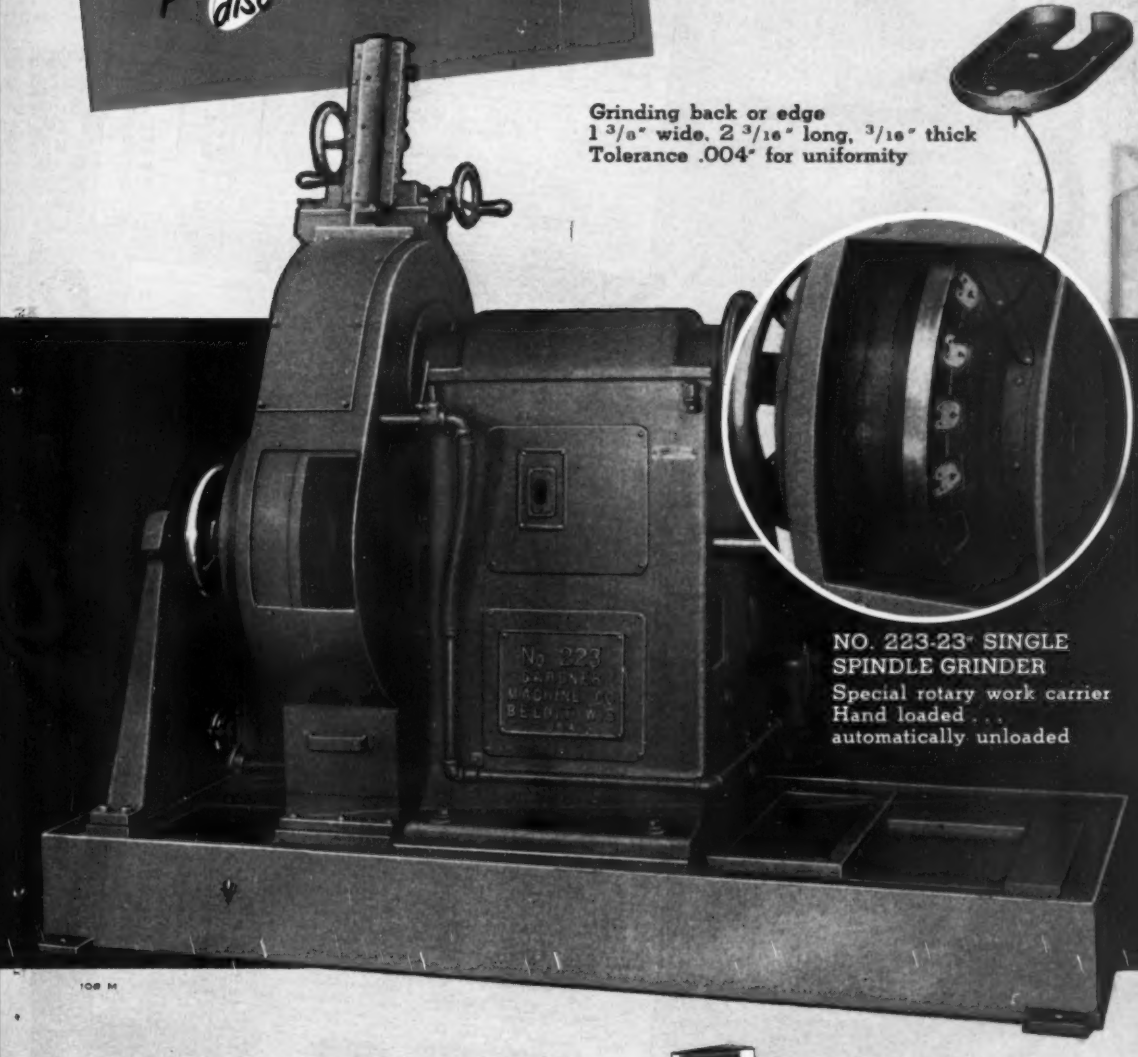
Machine Tool Craftsmen Since 1835

GARDNER

precision disc Grinders

40 Thin Steel Lock Plates Ground Per Minute

Grinding back or edge
1 3/8" wide, 2 3/16" long, 3/16" thick
Tolerance .004" for uniformity



NO. 223-23" SINGLE SPINDLE GRINDER
Special rotary work carrier
Hand loaded . . .
automatically unloaded

108 M

GARDNER MACHINE COMPANY
410 Gardner Street • Beloit, Wis.

Write for Catalog

Want **more** parts, **better** parts

MACHINE TEST REPORT

Stock Size – 7/16" Hexagon
Name – Automotive part
Machine – Davenport Model B – 9/16" – 6 spindle

COMPARATIVE PRODUCTION

GRADE	SFM	PART TIME (SECONDS)	GROSS PARTS PER HOUR	PRODUCTION INCREASE (PERCENT)	TOOL LIFE INCREASE (PERCENT)
B-1113	253	3.3	1,091	—	—
MX	287	2.86	1,259	15.4	73.2

*ESTIMATE OF COMPARATIVE COSTS

	B-1113	MX
Net Production/Hr. at 70% Efficiency	764	1007
Net Production/Hr. at 80% Efficiency	13.09	9.93
Hours to make 10,000 parts		
Direct Labor (one operator to two machines) @ $.925 Mach./Hr.	$12.11	$ 9.19
Machine Overhead @ $2.275 Mach./Hr.	$29.78	$22.59
Conversion Cost	$41.89	$31.78
Material Cost	$52.80	$53.50
Total Manufactured Cost of 10,000 parts	$94.69	$84.28
Saving	$10.41 or 11.05	

*Note – These cost figures have been calculated on the basis of current rates for Direct Labor and Machine Overhead and Machine Efficiency, used by a representative screw machine shop.

MACHINE TEST REPORT

Stock Size – 5/8" Rd.
Part Name – Appliance Bearing
Machine – Acme Gridley
Cutting Media – Combination lubricating and cooling oil – sulphur free

COMPARATIVE PRODUCTION

GRADE	SFM	PART TIME (SECONDS)	GROSS PARTS PER HOUR	PRODUCTION INCREASE (PERCENT)	TOOL LIFE INCREASE (PERCENT)
B-1113	185	7.2	500	—	—
MX	235	5.7	635	26.5	54.3

*ESTIMATE OF PRODUCTION COSTS

	B-1113	MX
Net Production/Hr. at 70% Efficiency	350	540
Net Production/Hr. at 85% Efficiency	28.57	18.52
Hours to make 10,000 parts		
Direct Labor (one operator to two machines) @ $.925 Mach./Hr.	$ 26.43	$ 17.13
Machine Overhead @ $2.275 Mach./Hr.	$ 65.00	$ 42.13
Conversion Cost	$ 91.43	$ 59.26
Material Cost	$104.70	$106.50
Total Manufactured Cost of 10,000 parts	$196.13	$165.76
Saving	$ 30.37 or 15.56	

*Note – These cost figures have been calculated on the basis of current rates for Direct Labor and Machine Overhead and Machine Efficiency, used by a representative screw machine shop.

MACHINE TEST REPORT

Stock Size – 3/8" Round
Part – Camera part

COMPARATIVE PRODUCTION

GRADE	SFM	PART TIME (SECONDS)	GROSS PARTS PER HOUR	PRODUCTION INCREASE (PERCENT)	TOOL LIFE INCREASE (PERCENT)
B-1113	195	10	360	—	—
MX	260	6	600	66.6	102.4

*ESTIMATE OF COMPARATIVE COSTS

	B-1113	MX
Net Production/Hr. at 70% Efficiency	252	510
Net Production/Hr. at 85% Efficiency	39.68	19.61
Hours to make 10,000 parts		
Direct Labor (one operator to two machines) @ $.925 Mach./Hr.	$ 36.70	$ 18.14
Machine Overhead @ $2.275 Mach./Hr.	$ 90.27	$ 44.61
Conversion Cost	$126.97	$ 62.75
Material Cost	$ 21.30	$ 21.60
Total Manufactured Cost of 10,000 parts	$148.27	$ 84.35
Saving	$ 63.92 or 43.1%	

*Note – These cost figures have been calculated on the basis of current rates for Direct Labor and Machine Overhead and Machine Efficiency, used by a representative screw machine shop.

-at lower cost per part?

...do the job with MX

today's fastest cutting Bessemer screw stock!

CHECK the machine test reports shown here. Notice what happened when MX was used in place of ordinary Bessemer screw stock:

- **In the automotive part, the use of MX increased production 15.4%, increased tool life 73.2%. And on an investment of 70 cents extra for MX, the cost of 10,000 fittings was reduced $10.41.**
- **In making the appliance bearing, time required to produce 10,000 was reduced by 10 hours—a 26.5% increase in production. Tools lasted over 50% longer, and total manufactured cost was $30.37 lower. All this for an extra cost of only $1.80 for MX.**
- **MX showed even better results on the camera part. Here at an extra cost of 30 cents for MX, 10,000 rollers were produced at a saving of $63.92. Production increased 66.6%. Tools lasted over twice as long.**

These increases in production, greatly-extended tool life and substantial savings in part cost, are typical of the benefits that you can obtain with U·S·S Free-Machining MX. Reports from shops that have used MX in a total of close to a billion parts of many different kinds, emphasize the fact that wherever fast-cutting MX is put to work, production goes up and costs come down. From the results obtained to date, we feel safe in saying that MX will cut the cost of *any* part you now machine from ordinary Bessemer screw stock.

U·S·S Free-Machining MX cuts costs in four ways. By increasing the rate of production, *it lowers the cost per part.* By prolonging tool life, *it reduces down-time.* By assuring better part finish, it often *eliminates extra finishing operations.* By providing closer dimensional accuracy, *rejections are minimized.*

If you haven't tried MX on a production basis, do it soon. Prove for yourself that MX, despite its slightly higher cost, is actually the most *economical* bar stock yet developed.

U·S·S Free-Machining MX is being produced in all the popular bar sections and sizes. You can obtain it in cold-finished form from your regular supplier as "MX" or under his own identifying trade name. In hot-rolled form, MX is available direct through our nearest district sales office.

Now, when production is more important than ever—speed up the job with MX

USS

AMERICAN STEEL & WIRE COMPANY, CLEVELAND • COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM • UNITED STATES STEEL COMPANY, PITTSBURGH
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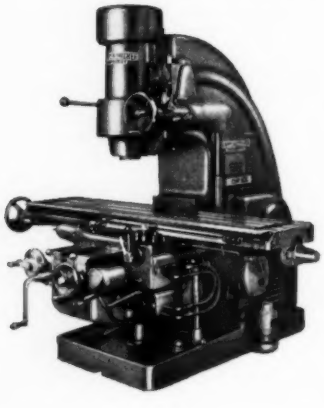
1-774

UNITED STATES STEEL

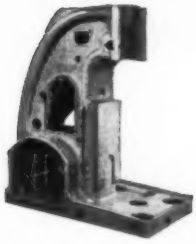
ANNOUNCING

The Addition of Vertical Style Milling Machines to the New KEARNEY & TRECKER MILWAUKEE CK Line



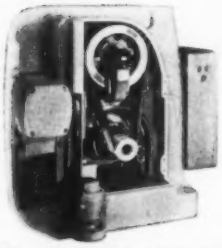
Kearney & Trecker's new CK line of Knee-Type Milling Machines is complete with Plain, Universal and now Vertical styles. These new Vertical CK's have every feature of the CK line. Features that are job and test-proven — designed to fill today's immediate needs — and to meet your tomorrow's milling requirements. You'll find they have all the new CK cost-cutting advantages — Greater Rigidity, Greater Horsepower, Greater Cutting Efficiency, Greater Productivity, Greater Versatility, Smoother Feed Performance and Greater Machine Life. If you need a new vertical style knee-type mill — don't fail to investigate these new CK's. They're the finest Kearney & Trecker has ever offered in a knee-type vertical machine. Five sizes — 10hp No. 2, 15 hp No. 3 and 25 hp Nos. 4, 5 and 6.

Replacement of obsolete machine tools is an



GREATER RIGIDITY — Yes, these new CK columns are the most rigid milling machine columns we've ever designed! They give you 1000 pounds more metal scientifically distributed in heavier ribbing, box section, sponson construction . . . to effectively absorb vibration from heaviest cutting loads.

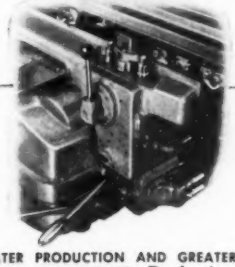
GREATER CUTTING EFFICIENCY — Added momentum of spindle-mounted flywheel assures longer cutter life and greater efficiency, through smoother, more positive drive — a key to most efficient use of modern cutting tools. Spindle rigidly supported by Kearney-& Trecker's original 3-bearing design.



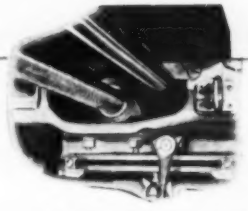
GREATER HORSEPOWER — where you need it. That's what you get with new CK independent motor drives for spindle and for feed and rapid traverse. Depending on machine size (Nos. 2, 3, 4, 5 or 6), machines range from 10 to 25 hp for spindle drive and 3 to 5 hp for feed and rapid traverse.

NON-GLARE RAPID-SET DIALS—You'll avoid costly errors in reading and setting these new micrometer dials. They're vapor blasted to give you a satin surface with high contrast markings. They're easy and quick to set and provide positive lock at every setting.

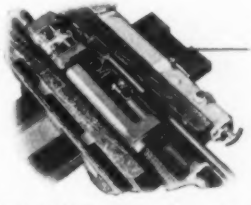
FEEDS AND SPEEDS TO TAKE FULL ADVANTAGE OF MODERN CUTTING TOOLS — and you really can do it with the broad feed and speed ranges on Kearney & Trecker's new CK milling machines. You get 24 spindle speeds (15 to 1500 rpm on Nos. 2 and 3, 13 to 1300 rpm on Nos. 4, 5 and 6) with Kearney & Trecker's automatic protecto-mesh shift to eliminate gear clashing. And there's the extra-wide feed range — 32 changes from ⅜" to 90" per minute—with separate 3 or 5 hp feed and rapid traverse drive.



GREATER PRODUCTION AND GREATER OPERATING CONVENIENCE—Production men will like Mono-Lever Control because it reduces idle cutter time, shortens floor-to-floor cycle time on both long and short run lots. Operators will like it because it makes faster, simpler, less fatiguing work for them.



SMOOTHER FEED PERFORMANCE — with a new design 2" diam. heavy-duty, table feed screw that affords greater bearing contact and runs through an extra-long table feed nut. These new CK machines are equipped with a backlash eliminator for more effective climb milling, more accuracy and longer screw life.

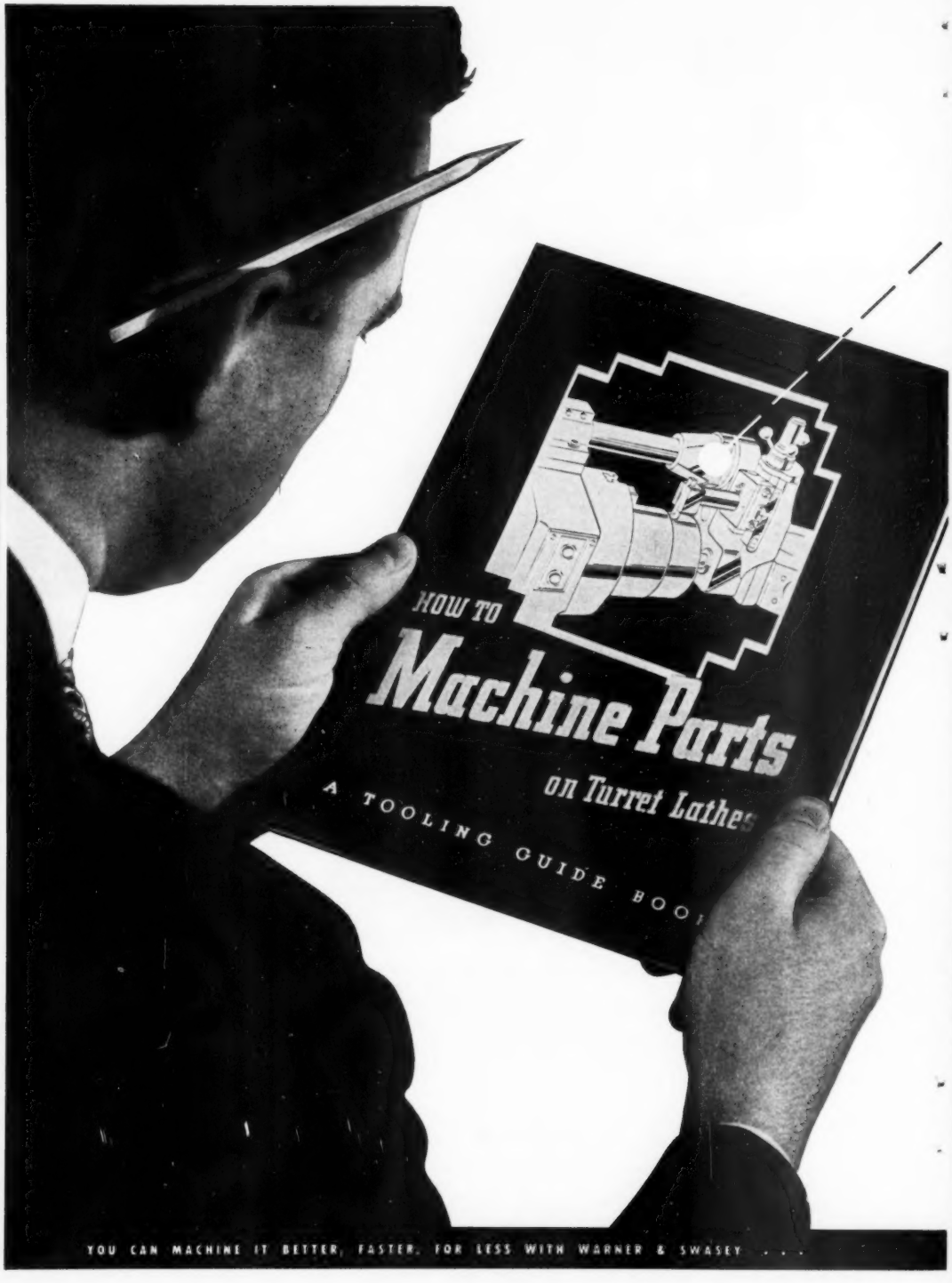


GREATER MACHINE LIFE — through automatic lubrication and generously proportioned gears and shafts throughout for overload conditions. There's a forced flood system in the column and knee, and a positive metered, pressure pump system for table, saddle and knee ways, and table feed assembly.

Kearney & Trecker's new CK Line is designed to meet every demand of present-day milling operations . . . making CK machines more accurate, and MORE PRODUCTIVE for you. Contact your nearest Kearney & Trecker representative or write direct to obtain complete specifications of these fine new machines. See how they easily replace obsolete machines at substantial savings to you. Kearney & Trecker Corp., 6784 West National Avenue, Milwaukee 14, Wisconsin.

KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

investment that makes both Dollars and Sense.


HOW TO
Machine Parts
on Turret Lathes
A TOOLING GUIDE BOO
YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY . . .

A textbook of tooling techniques

TO HELP INCREASE THE PRODUCTION OF YOUR TURRET LATHE OPERATORS

● Good turret lathe operators are scarce in today's tight manpower market. Yet you *must* have good, resourceful operators to get the maximum production required of your machines.

This means that new men must be trained to be productive—that present operators must be made more productive. HOW TO MACHINE PARTS ON TURRET LATHES, the book illustrated, can help you do just that.

This book presents fundamental machining principles for turret lathe operation. It shows, with illustrated examples and descriptions, proper selection and application of tools for small, medium and quantity lot production. It discusses how to combine the maximum number of operations to produce the accuracy and finish required in the shortest possible time.

By helping train your men to properly analyze the tooling requirements for each particular job, we believe this book will help increase your production. We make it available to you now at just 50¢ per copy. Mail the coupon below, noting the number you'll need.

For more complex tooling problems you may experience with your defense production, call in the Warner & Swasey Field Engineer in your territory— he'll be glad to help you in every way he can.

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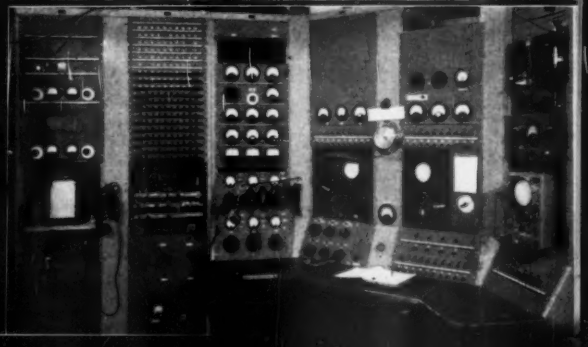
TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, AND TAPPING MACHINES

300,000,000

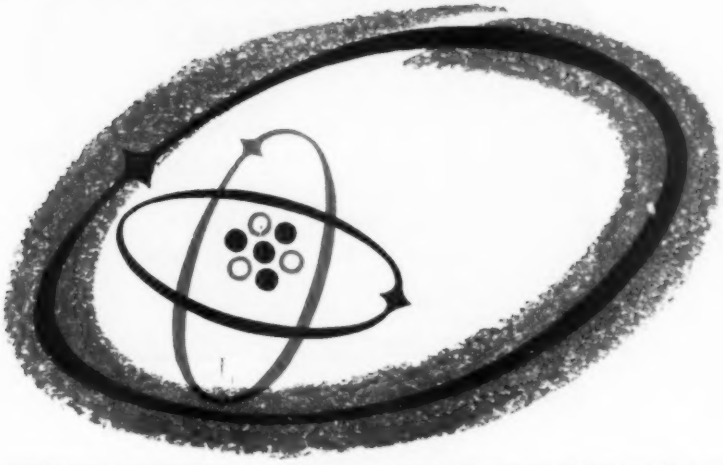
Precision turning of a special part on the LeBlond Dual Drive Lathe Cornell University Floyd Newman Laboratory of Nuclear Studies.

General view of the Cornell Synchrotron Laboratory



Master control panel keeps check on synchrotron

electron volts work here!



Cornell University's synchrotron accelerates atomic particles to energies of 300,000,000 electron volts. It makes possible the study of atomic nuclei and the forces which hold them together.

The Floyd Newman Laboratory of Nuclear Studies at Cornell needed a versatile, precision lathe to turn the myriad of special parts that go into a synchrotron . . . vacuum pump parts and connections, oscillator tube elements, cloud chamber components, plastic lenses, parts for a special stereoscopic camera, and many more.

They installed a new LeBlond Dual-Drive Lathe, recommended by LeBlond Distributor J. F. Owens Machinery Co. of Syracuse, N. Y. Result? Fast, convenient turning of a great variety of special parts to tolerances as low as .0002".

This new LeBlond Lathe provides hardened and ground steel bed ways; twelve speeds from 28 to 1800 r.p.m., all at full power; 96 feeds from .0004" to .1062"; 48 threads from 4 to 224; 15" swing, 3 h. p. motor. It gives you single-lever speed control; positive-jaw feed control; automatic lubrication to headstock, feed box, apron and ways; totally-enclosed quick-change box; and the American Standard taper spindle nose. You get more for your money in a LeBlond Dual-Drive than in any comparable machine.

Likely you'll never build a synchrotron. But for all the turning jobs you do encounter, there's a LeBlond Lathe to turn them faster, better. Your LeBlond Distributor will tell you about the Dual-Drive and other late models. Call him or write—

THE R. K. LeBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Bulletin No. 4A

for more information on the Dual-Drive

turned faster by **LeBLOND** *of Cincinnati*

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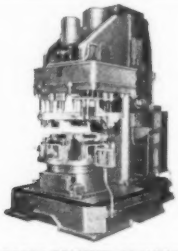
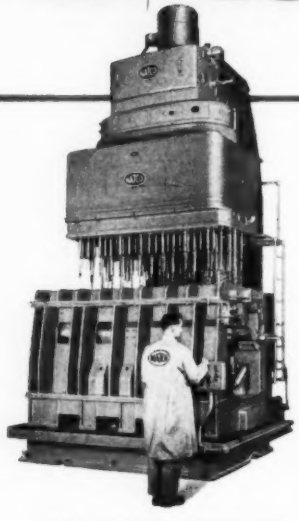
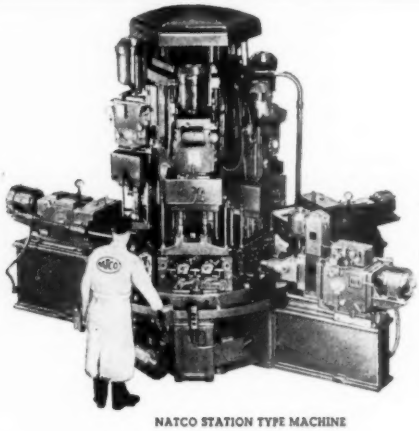
NATCO LIGHT SENSITIVE DRILLER AND TAPPER



NATCO HOLESTEEL ADJUSTABLE DRILLER AND TAPPER



NATCO HEAVY DUTY HOLESTEEL DRILLER



NATCO STATION TYPE MACHINE

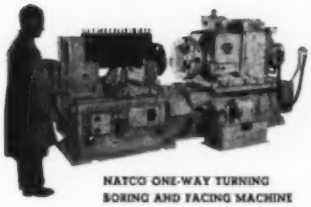
Out of the past fifty years of NATCO experience has come a deeper understanding of today's engineering and production problems. By reason of this maturity of understanding the NATCO organization is better equipped to help you solve your drilling, boring, tapping and facing problems. Better equipped with experienced engineers and designers. Better equipped with the most complete range of adjustable and fixed center multi-spindle machines in the world.

A few of the various NATCO machines are illustrated above. As you can see they range from small, fast, light-sensitive multi-drillers and tappers to large automatic processing machines . . . from single spindle to an unlimited number of spindles, from one direction to any number of directions, vertical, horizontal or angular, special or standard and operations range from 1/16" drill to 14" or larger bore. The materials worked include iron, steel, bronze, aluminum, wood and plastic.

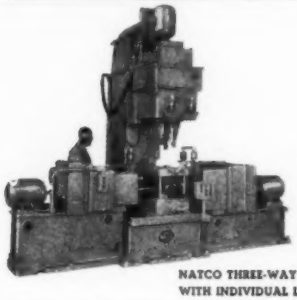
NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

NATCO HIGH SPEED SENSITIVE DRILLER AND TAPPER

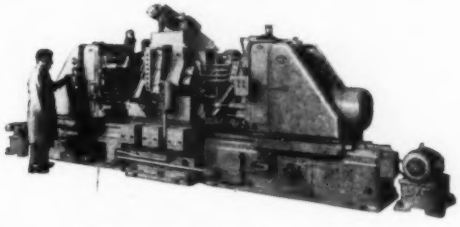
NATCO HIGH SPEED SENSITIVE UNIT



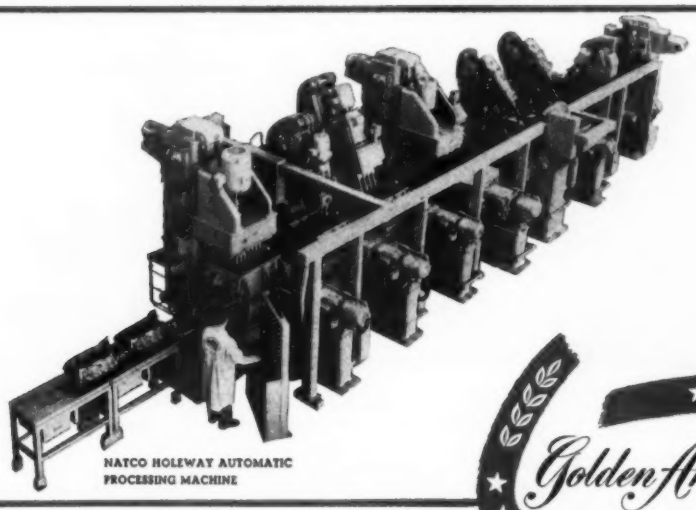
NATCO ONE-WAY TURNING BORING AND FACING MACHINE



NATCO THREE-WAY TAPPER WITH INDIVIDUAL LEAD SCREW



NATCO THREE-WAY TRUNNION TYPE DRILLING MACHINE



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Today NATCO offers you not only fifty years experience and ample production facilities but also several branch offices conveniently located to serve you in Detroit, Chicago, Buffalo and New York City.

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NUT-RUNNING TIME

on production line and maintenance jobs

CP Air Impact Wrenches are big time-savers on any nut-running job. They are the only complete line of impact wrenches with angle-head models in all sizes—to reach awkwardly located nuts, bolts and studs.

Power regulators assure uniform nut-running on production line work.

Available with side, pistol grip or straight handles, trigger or lever-type throttles, and angle heads for hard-to-reach nuts, bolts and studs.

There is a CP Impact Wrench to meet every requirement from ¼" to 1¼" bolt size.

Capacities — Bolt Size

CP-337	⅛"
CP-344	⅜"
CP-3440	⅜" heavy duty
CP-349	⅝"
CP-360	¾"
CP-3630	¾" heavy duty
CP-365	1¼"

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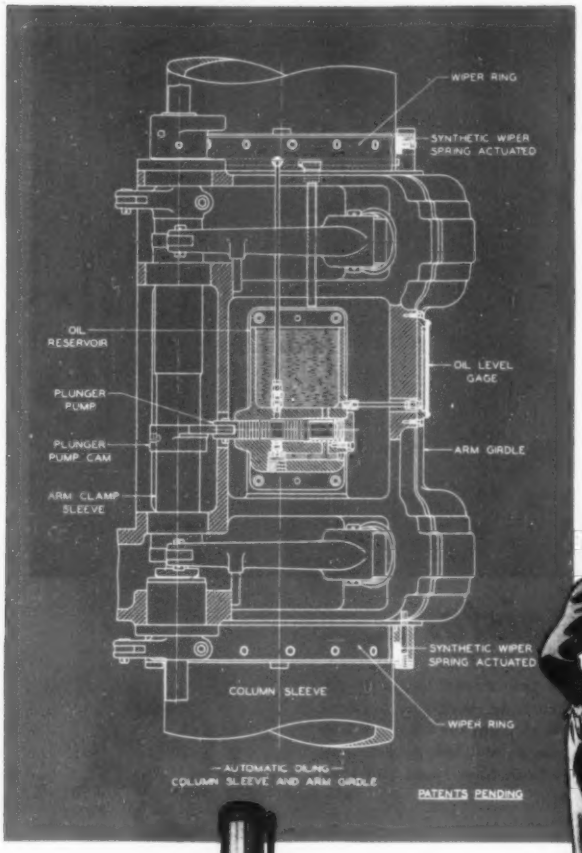
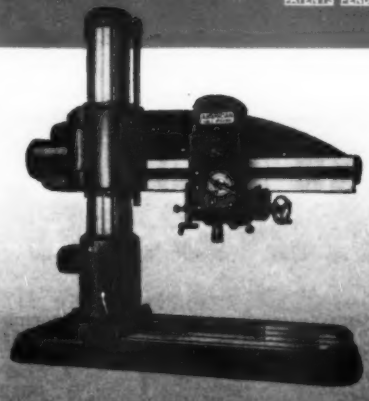
Column Scoring a thing of the past...

We've done something about it—



On the new "AMERICAN" Hole Wizard Radial the arm girdle and its mating column area are automatically oiled and cleansed. Actuation of the elevating lever operates a plunger pump in the arm girdle forcing oil into the distributing reservoir at the top which lubricates the entire arm girdle area. Abrasion and oil resistant synthetic wipers at top and bottom trap the oil to prevent leakage and thoroughly cleanse the column of all dirt and foreign matter ahead of the arm girdle when raised or lowered.

This positively reduces the danger of column scoring to an absolute minimum — just another "Hole Wizard" feature that insures long life and dependable service.



Bulletin No. 327 describes this and other exclusive "Hole Wizard" features of proven value. Want one?

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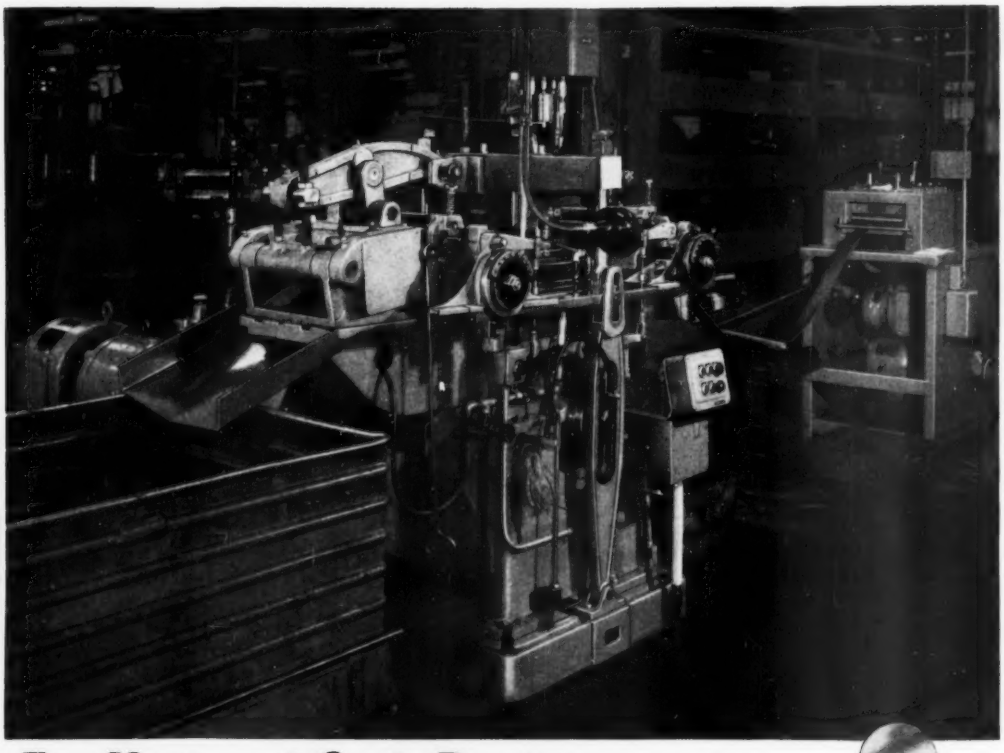
Cincinnati, Ohio, U. S. A.

LATHES AND RADIAL DRILLS



For National Cash Register which uses three sizes of Henry & Wright Dieing Machines to produce 310 different parts. Production rates range from 400 strokes per minute on a 25-ton machine to 80 strokes per minute on a 75-ton machine, with one or more completed parts produced per stroke. You can't beat them for long die life, or versatility. Remember this: because of their unique, revolutionary design, only Henry & Wright Dieing Machines give you both high speed and long die life. It's an unbeatable combination.

Only the best is

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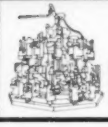

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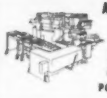

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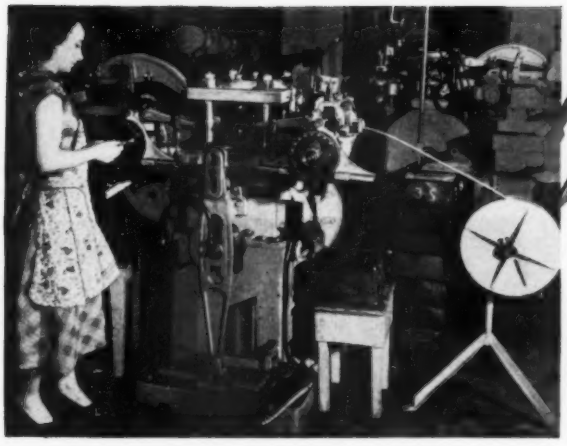
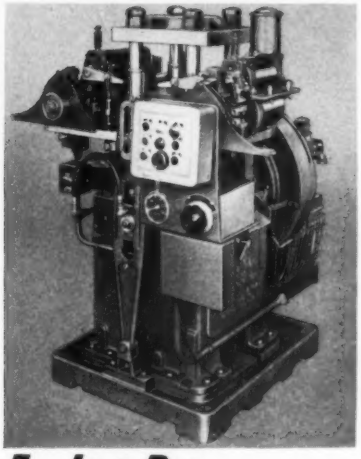
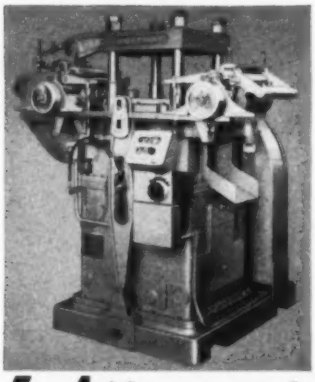


For The Esterbrook Pen

Company which, from the start, has used H. & W. Dieing Machines to produce a wide variety of components for its modern line of fountain pens. Esterbrook selected H. & W. Dieing Machines because of rigidity of lower platen and four-post guide — and their versatility. Stainless steel clips shown here are produced in combination dies which blank, form and mark.



For Link-Belt Company, which uses Henry & Wright Dieing Machines to produce parts for power transmission chain. Here is additional proof that you can depend upon H. & W. machines for speed, precision and sustained efficiency in the production of metal stampings.



For Addressograph-Multigraph

Corporation where complete-per-stroke production on Henry & Wright Dieing Machines keeps production rates high and costs low. Leading companies know they can get the performance they need with Henry & Wright machines.

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Complete descriptions of all Henry & Wright Dieing Machines. Write: Henry & Wright, 482 Windsor St., Hartford 5, Conn.

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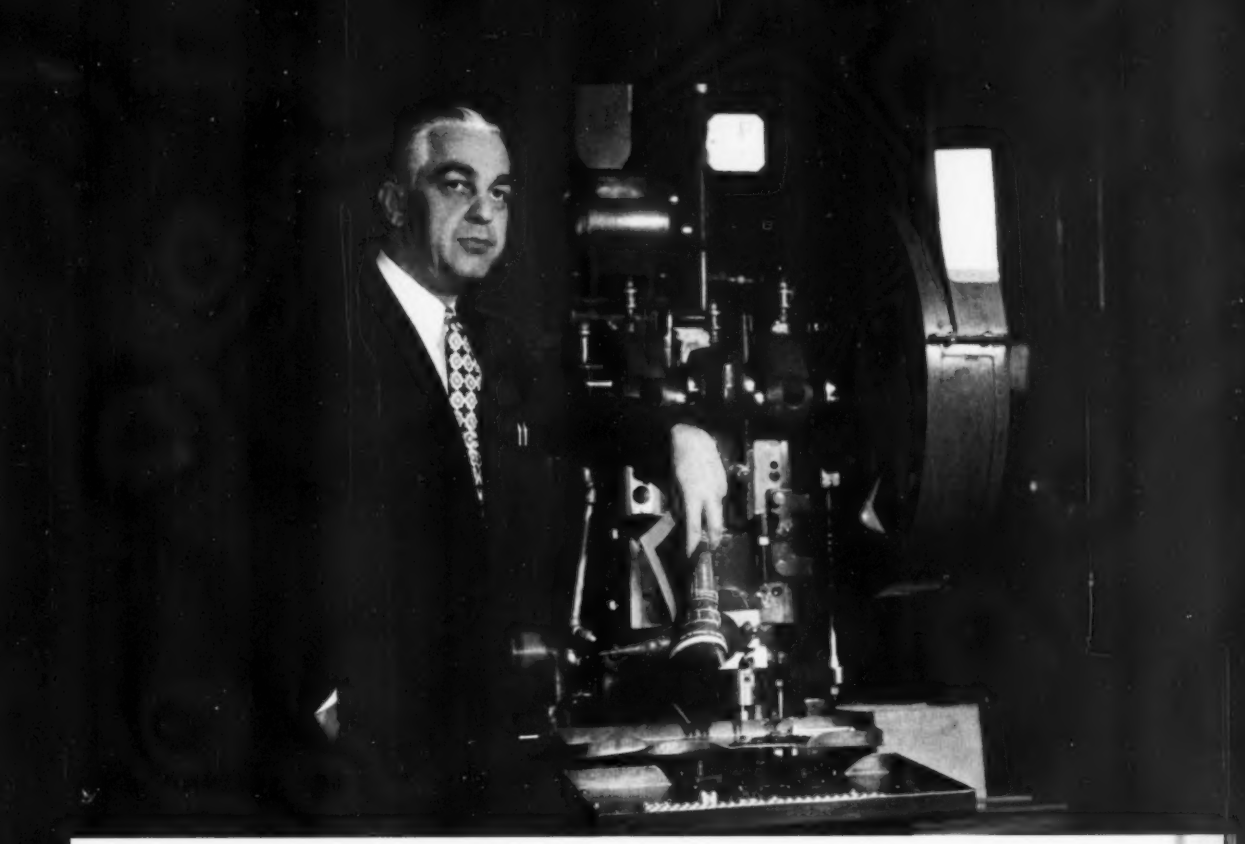
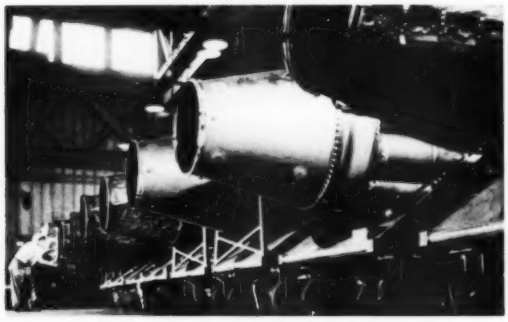


FRED A. HOFMANN, production vice president of the Elastic Stop Nut Corporation of America, says, "We're back on a full 2-shift production schedule, and practically every one of the 62 Tri-Clad motors we've installed since 1941 in our plant at Union, N. J., is going night and day. Sure, we make a lot of steel products But for a general-purpose motor, we don't think you can beat cast iron. After the pounding we've given our Tri-Clad motors for the past 10 years, we're stronger than ever for Tri-Clads."

ELASTIC STOP NUT CORPORATION:

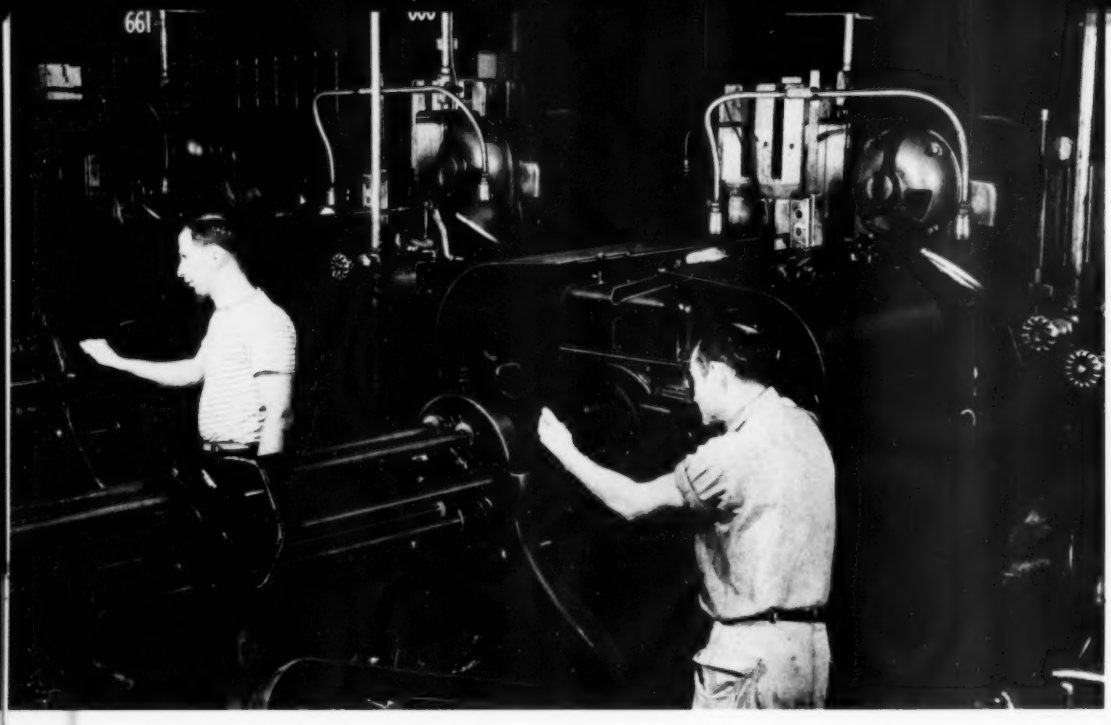
"We're stronger than ever for Tri-Clad triple protection!"



TRI-CLAD MOTORS drive machines that produce ESNA fasteners for use on jet aircraft engines—the engines that power our modern military planes. Each of the jet engines above uses a large number of these special stainless-steel high-temperature nuts, designed to hold under the extreme heat and other severe conditions of jet-engine operation. Moreover, these nuts must be re-usable without seizing or galling the finish. ESNA counts on the reliability of their Tri-Clads to help turn out thousands of these fasteners every day.

VIRILE VETERAN. This 10-hp Tri-Clad motor has been driving an Acme Gridley multiple spindle bar machine for nearly 10 years. It's still going strong, another reason why, after 10 years, ESNA thinks Tri-Clad is still their best motor buy! And today's Tri-Clad motor, all-industry favorite, is better than ever!

GENERAL ELECTRIC



4 STEPS—AND NO HANDS! Backbone of the ESNA production line, the Acme Gridley automatic bar machine (3 shown above) ejects a finished nut blank every 4½ seconds. The operator simply keeps the six spindles supplied with bar stock. The machine feeds stock, machines the nut profile, drills 2 holes and cuts off to accurate lengths. The load on the 10-hp drive motor is heavy and constant—but Tri-Clad, with its bearings completely enclosed in cast-iron housings, can take it! Maintenance department can't recall a single Tri-Clad bearing ever having to be replaced. Moreover, if they need it, the motors are easily geared while running.

GE

TRI CLAD MOTORS

REG. U.S. PAT. OFF.

Help Keep ESNA Production Up!

PRODUCTION PUSHER General plant foreman Karl Kjellburg has the job of meeting "impossible" defense program manufacturing schedules. He's counting heavily on automatically fed machines like the Tri-Clad driven V. & O. press on his left, says, "This press inserts over 200 elastic fibre locking collars a minute in a ⅜" fastener. Driving it is a big job for a motor. Our Tri-Clads gave us no trouble during the war. We're counting on them again!"

TROUBLE SHOOTER TESTIFIES Ed Conk, ESNA's maintenance chief, must furnish reliable power wherever it's needed in the plant. He's got some definite ideas about electric motors; says, "We like a motor you can regrease easily *if you have to.* So far, we've had to regrease very few of our Tri-Clad motors. And those were either on hot spots or on particularly tough jobs. The point is—we *could* readily have regreased them all if it was necessary."

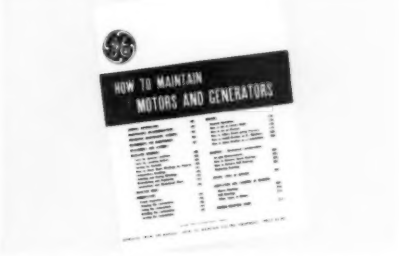
TOUGHEST... on the inside Extra protection against electrical breakdown is built into every Tri-Clad motor. Formex* wire windings, one-piece cast-aluminum rotor, double-end ventilation—these are features that prolong a general purpose motor's useful life.

TOUGHEST... on the outside Teeth rattling blows, dripping liquids, corrosive fumes—they're all in a day's work for Tri-Clad cast-iron construction. You get a rigid structure, too—one that won't twist out of line when you're bolting it down.

TOUGHEST... at the bearings A Tri-Clad motor will run safely without relubrication for as long as any general purpose motor you can buy. But, if the application does make relubrication a "must", you can grease your Tri-Clad without halting production.

** Reg. U.S. Pat. Off.*

How to Keep Your Motors in Shape for the Job Ahead!



TIMELY READING With every electric motor needed on the line, once again it's time to be a crank about motor care. That's why every motor user needs this General Electric manual. Tells how to spot motor and generator trouble before it happens, how to prevent serious breakdown, how to conduct a regular motor maintenance program. Order a copy for your maintenance department today! Use the coupon!

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GENERAL ELECTRIC

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9 Slide Films and Accompanying Manuals To Help You Get the Most Out of Electric Motors

Timed to help meet the growing demand for skilled industrial workers, this new General Electric Motor Selection and Application Course is a boon to everyone concerned with technical training problems. Here, in 9 short, easily understood lessons, is a "how-to" course that offers a broad introduction and review of motor principles and uses to engineers, plant personnel, students and all others concerned with motors. *It's a valuable production-boosting tool for any type plant!* Ask your G-E representative for more details on this course or mail the coupon today.

HERE'S WHAT THIS COURSE CONSISTS OF:

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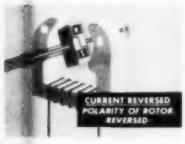
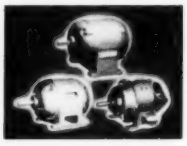
Here's a Quick Look at the Scope of the Course



Lesson 1—"Fundamentals of Motors"—Basic principles of motor operation, how a-c and d-c motors work, construction features, etc.



Lesson 2—"Types of Motors"—Horsepower, speed and torque and other characteristics, ranges of application, design features.

Lesson 3—"Fundamentals of Selection"—A study of the five basic steps that are usually followed in the selecting of any motor.

Lesson 4—"A-C Polyphase Induction Motors"—Characteristics of the three basic types: squirrel-cage, wound-rotor, adjustable-speed induction.

Lesson 5—"Single-Phase Integral-HP Motors"—General range of applications, torque and safety factor, capacitor and repulsion-induction types.

Lesson 6—"D-C Motors"—Basic types: shunt, series, compound; horsepower formulas, adjustable speed applications, versatility, etc.

Lesson 7—"Synchronous Motors"—Where used, design features, power factor improvement, and other basic operating benefits.

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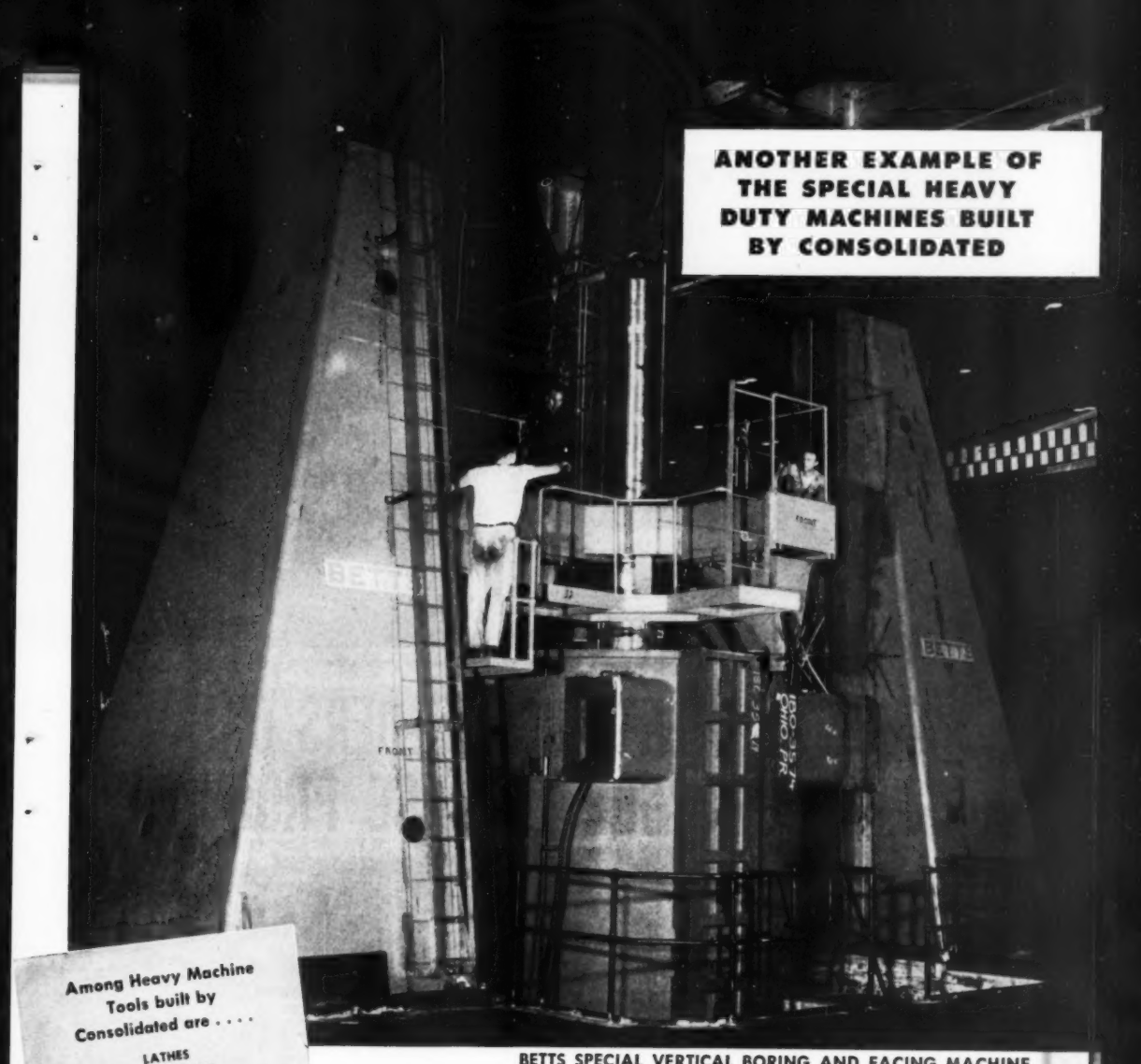
GENERAL ELECTRIC

684-20



ANOTHER EXAMPLE OF THE SPECIAL HEAVY DUTY MACHINES BUILT BY CONSOLIDATED

Among Heavy Machine Tools built by Consolidated are . . . .

- LATHES
- BORING MILLS
- DRILL PRESSES
- MILLING MACHINES
- BORING MACHINES
- COLD SAW MACHINES
- BORING, DRILLING AND MILLING MACHINES
- DRILL AND TOOL GRINDERS
- PLANERS
- SLOTTERS
- RAILROAD SHOP TOOLS
- AUTOMOTIVE TOOLS
- AND OTHER SPECIAL MACHINES

BETTS SPECIAL VERTICAL BORING AND FACING MACHINE

Built for one of the larger electrical companies and used for boring and facing heavy welded steel generator stator frames from a vertical position, this unusual machine eliminates the inaccuracies heretofore present in such operation performed horizontally and, at the same time, reduces boring time by approximately two-thirds. It may also be used for drilling rib sections and milling spring assemblies. This machine is 36'-6" high, 13'-0" of which is below the floor level. Weight approximately 190,000 pounds. The boring bar is 22" in diameter and 36'-0" long.

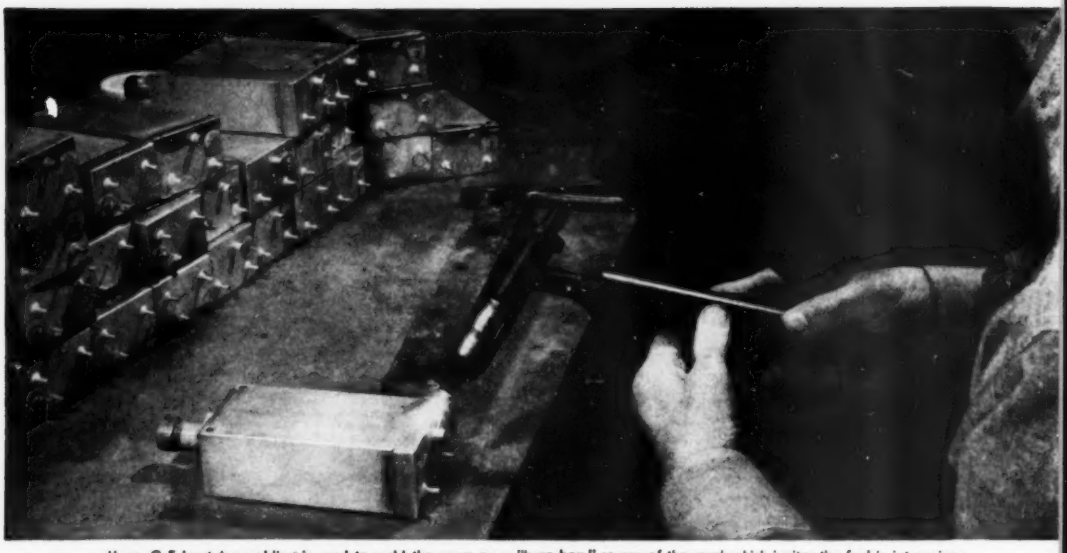
BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK



Here, G-E Inert-Arc welding is used to weld the seam on a "buzz box," source of the spark which ignites the fuel in jet engines.

WHY G-E INERT-ARC WELDERS CAN SPEED UP YOUR DEFENSE PRODUCTION

You can speed up the fabrication of ship and plane parts made of aluminum, magnesium, or copper alloys by using General Electric a-c Inert-Arc welders because they are specially designed for welding these materials. They give your operators many features not found in "jury-rig" modifications of ordinary a-c metal-arc welders.

Exclusive "Balanced Wave" Design

Balanced-wave design, for example, an exclusive feature of G-E Inert-Arc welders, enables your operators to increase travel speeds, make stronger welds, and reduce power and gas consumption.

"Idlematic" Control for Safe, Simple Operation

The high-frequency pilot, the flow of gas, welding current, and cooling water are controlled by the use of G-E "Idlematic" control. This permits the operator to save time and reduce spoilage by making it easy to start the arc at the proper spot on the work because he can position the electrode with his hood up.

Crater-filler or Remote Control

On applications requiring weld craters to be level at the end of each weld bead, use of the optional G-E crater-filler will enable you to do the job quickly. Where desired, a hand or foot switch can be furnished to allow continuous stepless current control while welding.

Write for Free Bulletin

For detailed information on how you can speed up fabrication of aluminum and other alloys, write for bulletins GEC-596 and GEC-653. *General Electric Company, Schenectady, N. Y.*

G-E Inert-Arc welders are easy to use. Simply touch the electrode to the work and you're off to a quick clean start—and without using flux. The welders are available in 200-, 400-, and 800-ampere ratings.

G-E "BALANCED WAVE" GIVES STRONGER WELDS, FASTER TRAVEL SPEEDS—with reduced power and gas costs

Key to the advantages of the G-E "balanced-wave" Inert-Arc welder is the use of series capacitors in the output circuit. These capacitors block the d-c current which would otherwise be produced by the arc, and make it possible to get an even, uniform flow of a-c current.

This design, with the high-frequency pilot used only for starting, eliminates objectionable radio interference caused by welders using continuous high frequency.

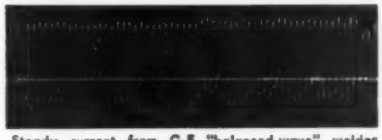
You Get Stronger Welds, Faster Travel Speeds

Under identical conditions G-E "balanced-wave" welders give you a greater depth of penetration, better bead contours, and greater fusion area than welders with unbalanced-wave circuits.

This means, therefore, that an operator can do the job faster by using the G-E equipment.

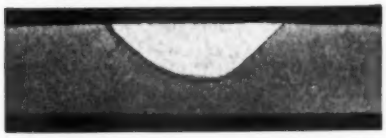
G-E Inert-Arc Welders Give Even Flow of Current

Conventional Shielded-arc Welders Give Uneven Flow



Steady current from G-E "balanced-wave" welder gives better welding at lower cost than unbalanced-wave currents from shielded-arc equipment.

"Balanced Wave" of G-E Inert-Arc Welders Produces Deep Penetration, Wide Fusion Area



Unbalanced Wave of Ordinary a-c Metal-arc Welders Produces Shallow Penetration, Narrow Fusion Area

Above macrosections are from two pieces of ¼-inch aluminum, on which beads were run without the addition of filler metal, and under identical welding conditions.

ASK ABOUT G.E.'s THORIATED TUNGSTEN

For d-c Inert-Arc welding only—you get 10 times normal electrode life with thoriated tungsten electrodes. Its strength compares with standard pure tungsten. Write today for more information. *General Electric, Schenectady, N. Y.*

G-E Inert-Arc Welders Can Reduce Your Power and Gas Costs

Because your operators can weld faster with G-E Inert-Arc welders, less gas and power are consumed. Saving in power costs and gas consumption have been estimated as high as 25% using G-E Inert-Arc welders, because of Idlematic control, series capacitors and momentary high-frequency pilot.

Holders and Tungsten Electrodes Are Designed for High-speed Work

An operator can adjust by hand a tungsten electrode in the illustrated holder. No wrenches are required.

And he can do a wide variety of jobs with the same holder. Using it with a 200-ampere G-E Inert-Arc welder, for example, an operator can weld both light- and medium-gage materials, with electrodes up to eight inches in length in diameters of .040, $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, and $\frac{5}{32}$ inches.

To give you the right electrode for any job, G.E.'s 99.9% pure tungsten is available in a wide variety of diameters and lengths in both standard and thoriated types.

Holders for G-E Inert-Arc welders are available for any current requirement from 15 amperes to over 800 amperes, a-c or d-c.

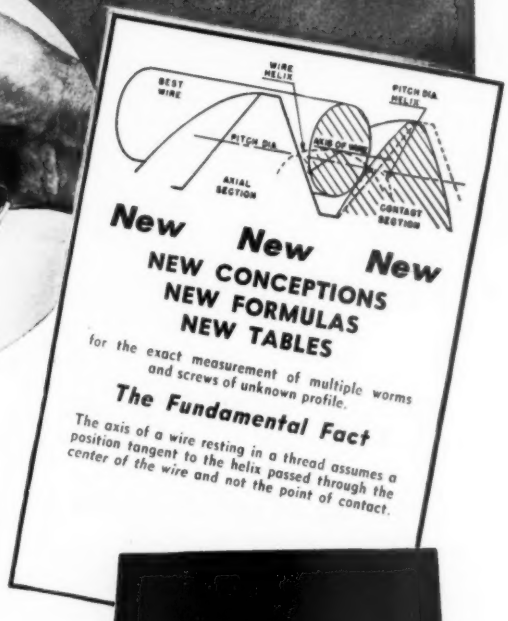
GENERAL ELECTRIC

731-85

Van Keuren MEASURING WIRES

STANDARD EQUIPMENT... ...everywhere

Measuring the pitch diameter of a 1"-8 National Form thread gage. This method is recommended by the Bureau of Standards.



New New New

NEW CONCEPTIONS
NEW FORMULAS
NEW TABLES

for the exact measurement of multiple worms and screws of unknown profile.

The Fundamental Fact

The axis of a wire resting in a thread assumes a position tangent to the helix passed through the center of the wire and not the point of contact.

Van Keuren Measuring Wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, hobs, worms, splines and gears. Reputable manufacturers of ground taps and thread gages used for the production and acceptance of threaded holes and nuts use Van Keuren Measuring Wires. You will seldom find them in error if you, too, have Van Keuren Measuring Wires.

Catalog and Handbook No. 34

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request.

Set No. 20 Thread Measuring Wires is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded parts.

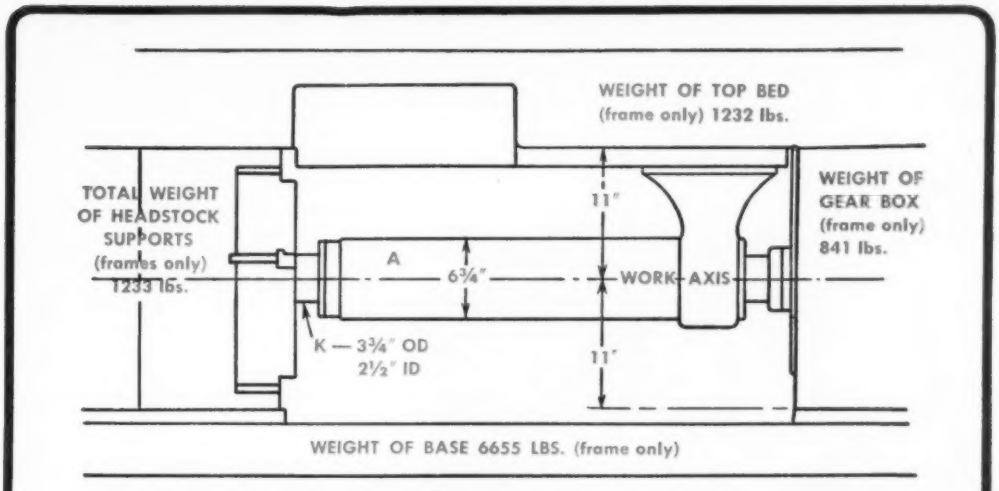
Price, High Speed Steel Wires $120.00
Price, Carboloy Wires 500.00

Special wires from .002" to 2.000" diameter are made to any tolerance required.

THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

32nd YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires



MAKER OF "HISTORIES"

The above drawing illustrates a Tooling Area that has staged many outstanding cases of machine adaptation and performance. Case histories are very useful as examples of machine adaptation, but their blanket use as unqualified proof of dependable performance is not convincing.

Buyers know that varying requirements and conditions of various plants make "buying what the other fellow buys" an unsafe practice. They know that good case histories will result if machine facilities have been properly selected. No plant could long afford to have it otherwise.

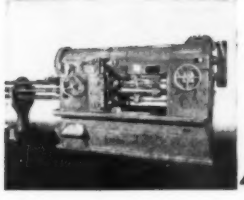
A "top performer" of the 1½" SIX SPINDLE CONOMATIC TOOLING AREA, shown above, is the MAIN END SLIDE. The specific data given tells why:

1. **It has a greater maximum load recommendation and a stronger frame support than the main end slide of any other "automatic".**

The 272 lb. alloy carburized steel Main End Slide, A, is 33⅝" long, and has a maximum load recommendation of 4800 ft. lbs. Its round surface is machined to close limits. It is supported in nickel iron, split, sleeves on the alloy steel Way, K, with a total bearing of 136.9 sq. ins.

2. **It handles more work; has more adaptable tooling positions, and more selective feeds, than the main end slide of any other "automatic".**

The 27⅞" tooling-length of the Slide handles shaft jobs up to 18" in length. The 2⅝" swing clearance permits die-head threading to full machine capacity in any, or all, six positions without Slide alteration. Nine pairs of pick-off gears give 68 feed changes for each work spindle speed.



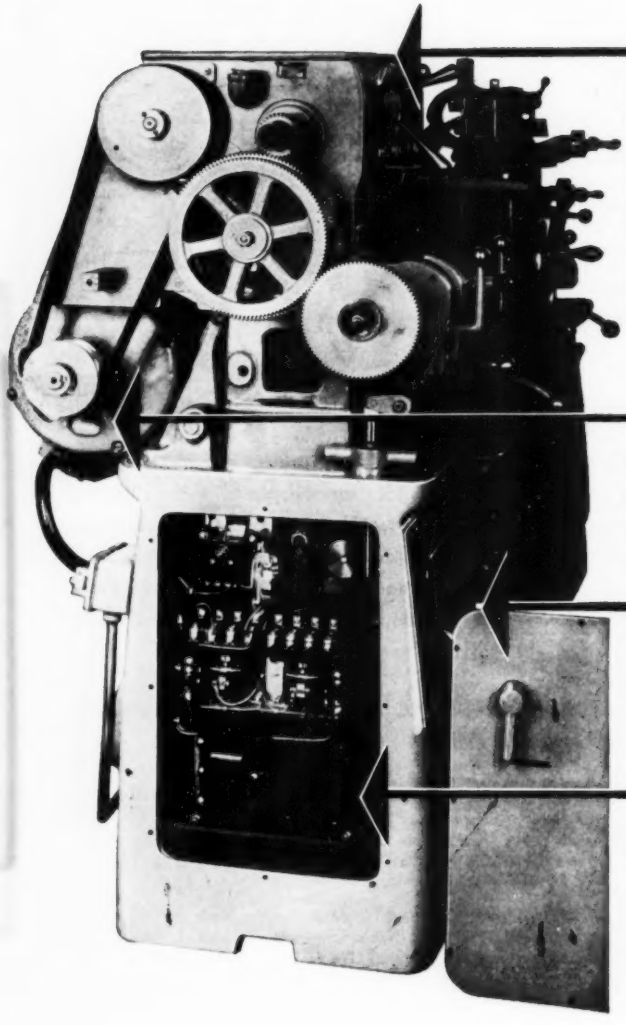
Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

pile it on a tray-top



tops for operator convenience

Tray-Top light duty engine lathe operators save many minutes per hour with mikes, tools, etc., parked on top of headstock and tailstock—right handy, safely off lathe ways and carriage. Direct reading color-match speed selector shifts instantly to any of 12 spindle speeds (all geared, 40 to 1 overall ratio)... When you pile work on Tray-Tops, maximum operator convenience pays off in more pieces per hour.

open air maintenance

Another important time and money saving advantage: Tray-Top motors are accessibly mounted thereby reducing down time for maintenance.

"cool" push buttons for safety

220 volts or higher power supply, when used, is stepped down to 110 volts at push buttons and drum switch for maximum operator safety.

blackboard simplicity in wiring

Totally enclosed electrical panel is a model of clean simplicity and safety. Access cover is locked with main disconnect switch. Panel must be dead when cover is off. Before you buy a light duty engine lathe, compare prices and get the whole picture of Tray-Top's outstanding values.

CINTILATHE

OF OUTSTANDING VALUE

CINCINNATI 9, OHIO, U. S. A. **cincinnati lathe & tool co.**

LINK-BELT Ball and Roller Bearings smooth the path of power

Integral self-alignment—angular contact of concave rollers operating between convex raceways—inner raceway free to move in any direction.
Full load capacity for radial, thrust or combination of radial-thrust loads is assured even with shaft deflection or misalignment.
Accurately formed, hardened steel retainers space and guide the rollers.
Rollers are naturally positioned by their concave shape, assuring free rolling and eliminating end friction—no pinching or binding of rollers.
Bearing parts are assembled to proper clearance and locked together as a complete assembly.
Straight bore mounting for press fit direct on shafting. Tapered adapter sleeve also available for use with commercial shafting where ready means of removal and installation of bearing are advantageous.
CUTAWAY OF SERIES DE UNMOUNTED ROLLER BEARING WITH STRAIGHT BORE MOUNTING.

By any standard . . . LINK-BELT Roller Bearings always assure anti-friction alignment

Integral self-alignment of Link-Belt Unmounted Roller Bearings eliminates need for expensive, cumbersome self-aligning housings. Angular contact, concave rollers between convex raceways, provides capacity for thrust and radial loading. Preadjusted for clearance at the factory and packed to reach you in "final inspection" condition, they require no adjustment when you're ready for installation. There's a Link-Belt Bearing Specialist near you who can give you expert advice on *any* bearing application. You can also get all the facts from Data Book 2550.

LINK-BELT

Ball and Roller Bearings

LINK-BELT COMPANY: Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal cities. 12,200

Only MARVEL *builds all four**

While it is true there are several builders of hack sawing machines and many builders of band sawing machines, only MARVEL builds *BOTH* hack saws and band saws. The fact is that MARVEL manufactures 35 models of 10 basic types of metal sawing machines which include the world's fastest automatic production saw, the world's largest giant hydraulic hack saws, the world's most versatile band saw and the most widely used small shop saws.

With intimate and broad field experience in all types of metal cutting-off equipment and 35 different saws available, it is obvious that MARVEL Field Engineers occupy a unique and exclusive position in the industry. They are eminently qualified to make expert and *unbiased* recommendations covering the type, size and model of metal sawing equipment best suited to individual requirements—the most efficient, most accurate, fastest, broadest in scope and the most economical.

MARVEL is also the only manufacturer of both metal sawing *machines* and metal sawing *blades*. Because the efficiencies of both the machine and the blades are interdependent, each upon the capability of the other, expert knowledge covering both saws and saw blades is essential to the proper appraisal of any specific sawing situation. Correct balance of cutting speed and blade life, feed pressure and blade tension are all potent factors in over-all performance. Here again it is the MARVEL Field Engineer who is qualified to provide the comprehensive answer to your question. His job is to help you saw metal most efficiently—his services are available upon request—gratis.

***HACK SAWING MACHINES**

***BAND SAWING MACHINES**

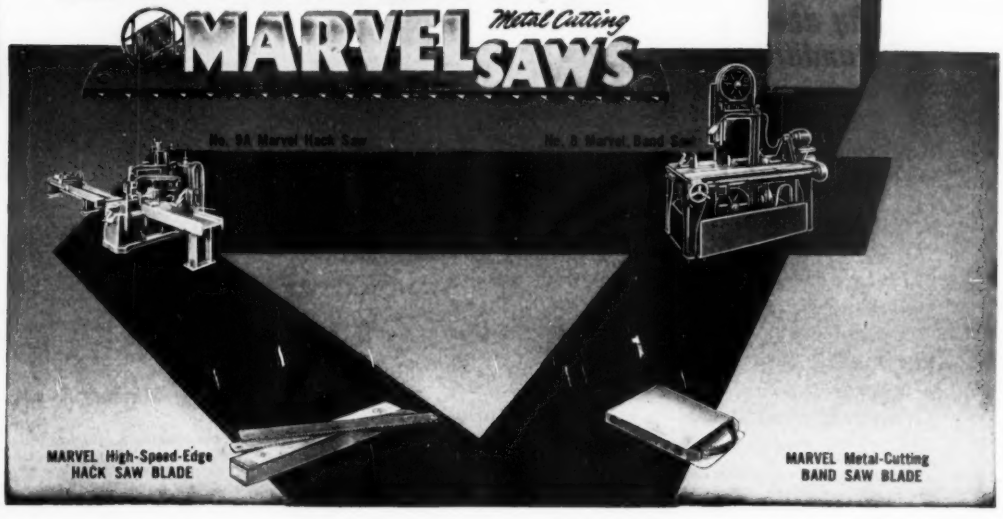
***BAND SAW BLADES**

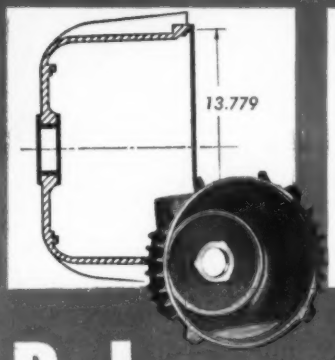
***HACK SAW BLADES**

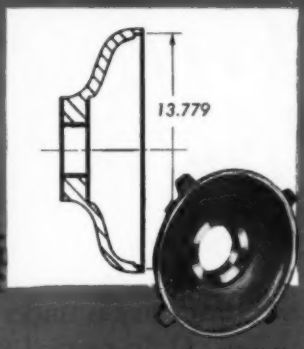
Write for Catalog 49

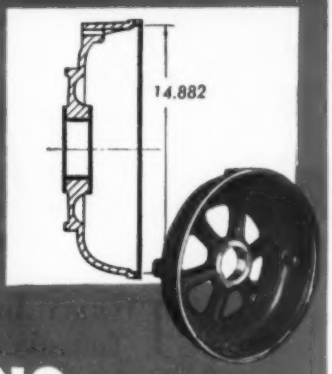
ARMSTRONG-BLUM MFG. CO.

BLOOMINGDALE AVE., CHICAGO 39, U.S.A.



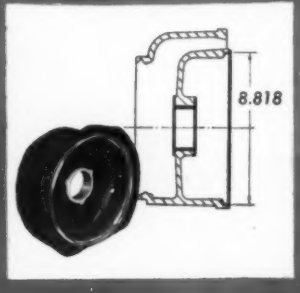


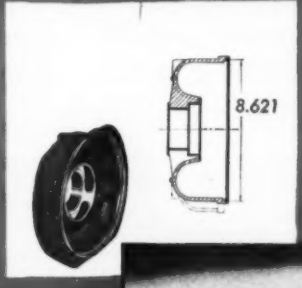


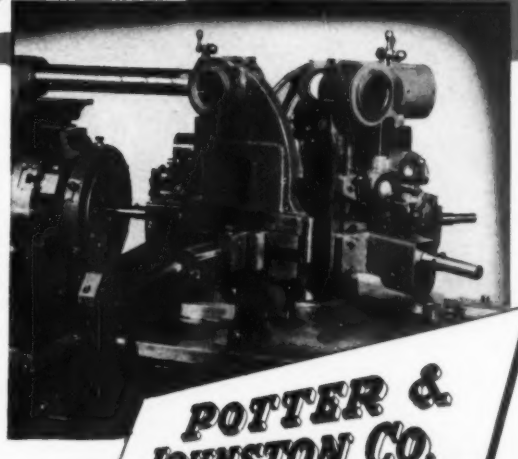


P&J TOOL ENGINEERING

ACCELERATES PRODUCTION . . . SIMILAR P&J-DESIGNED SETUPS MACHINE FIVE DIFFERENT JOBS IN RECORD TIME ON TWO POTTER & JOHNSTON AUTOMATICS







THESE several types of motor brackets require similar machining operations, as indicated by heavy lines in the drawings. Two P&J Automatics speed up this class of work — Models 5DE and 6DRE. Experience and full understanding of their capacities and versatility permitted P&J Engineers to design similar tooling setups for both machines.

Result: a most efficient combination of multiple cuts . . . faster machining times . . . greater precision . . . fewer rejects . . . definite reductions in work handling . . . and the division of labor costs by one man's handling of more than one machine. *Your* Tooling can be similarly engineered by sending parts or prints to P&J for recommendations and time estimates.

POTTER & JOHNSTON CO.
PAWTUCKET, R. I.
subsidiary of PRATT & WHITNEY
Division Niles-Bement-Pond Company

P&J

More than 50 Years' Experience in Tooling for
PRECISION + PRODUCTIVITY + ECONOMY

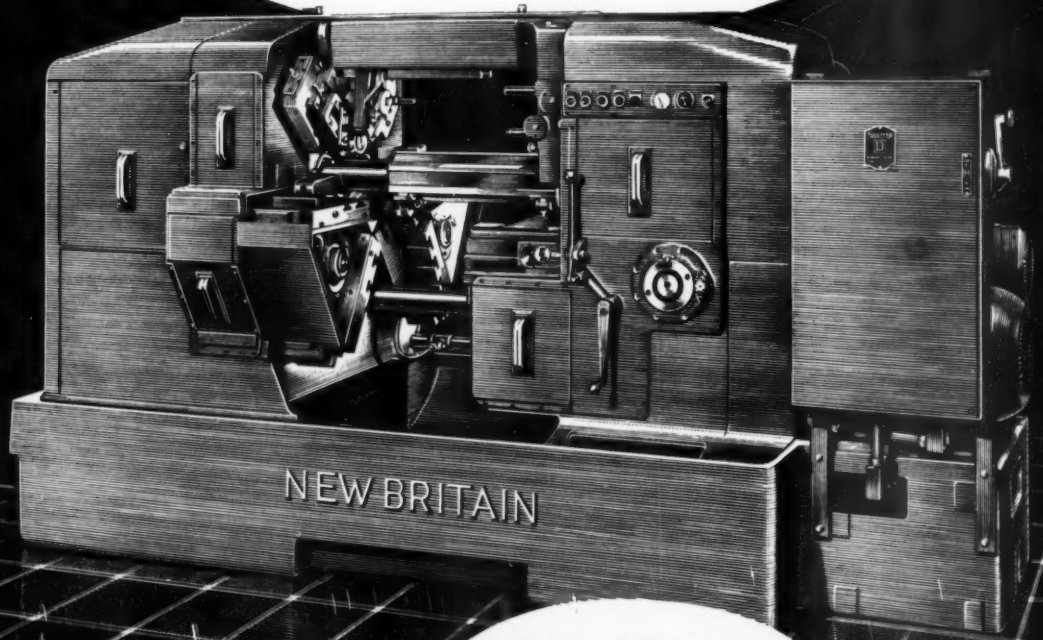
Greater Productivity

...More Horsepower...Less Man Power

TODAY American Industry is under pressure to meet fantastic demands. Only yesterday, intense competition was the problem. Manufacturers have found the answer to both situations in more productive machine tools. The New Britain-Gridley Division, The New Britain Machine Company, New Britain, Conn., U.S.A.

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES

LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES



NEW BRITAIN

Automatics

How CARBOLOY Service can help you . . .

Conserve Carbide Sheet-Metal Dies

Die Engineering Manual D-124

All the facts on how to finish and service your vital carbide sheet-metal dies for longer die life, fewer rejects, better finish, closer tolerances, and lower costs. Send the coupon today for your free copy.

Die Engineering Service

Carboloy Company's trouble-shooting Field Engineers often can come up with valuable suggestions for increasing production, conserving dies. Contact your local Carboloy Field Engineer or mail coupon for this free service.

Die Training School

Specialized courses in finishing and servicing carbide dies for extra life are available to your die-room personnel at Carboloy Company's Detroit plant. Check coupon.

Boost Cartridge Case Output

Carboloy Company has the top-quality dies, the complete services and the practical World War II experience to help you get *maximum efficiency* in producing cartridge cases for small arms and larger sizes.

Carbide dies outwear steel dies many times, are essential for the high production of brass cartridge cases and a must for the production of steel cartridge cases. Carboloy Company, world's largest manufacturer of cemented carbides, can furnish any size carbide die for both steel and brass for drawing, tapering and shouldering.

Carboloy's Field Engineers and skilled plant personnel, armed with valuable experience from the last war and facts on latest die applications, will tackle your special production problems. And Carboloy's Die Training School (described above) can train your die men in the care and service of large and small dies for longer life.

"Carboloy" is the trademark for the products of Carboloy Company, Inc.

Get all the details on Carboloy die and Carboloy Services.

FILL OUT THE COUPON . . . MAIL IT TODAY! →

SPECIFY

CARBOLOY®
CEMENTED CARBIDE

CARBOLOY COMPANY, INC.
A General Electric Affiliate
11149 E. 8 Mile Blvd., Detroit 32, Michigan

We are interested in your dies and services for producing _____.

Please send information on

☐ Die Training School ☐ Die Manual D-124 ☐ Die Engineering Service

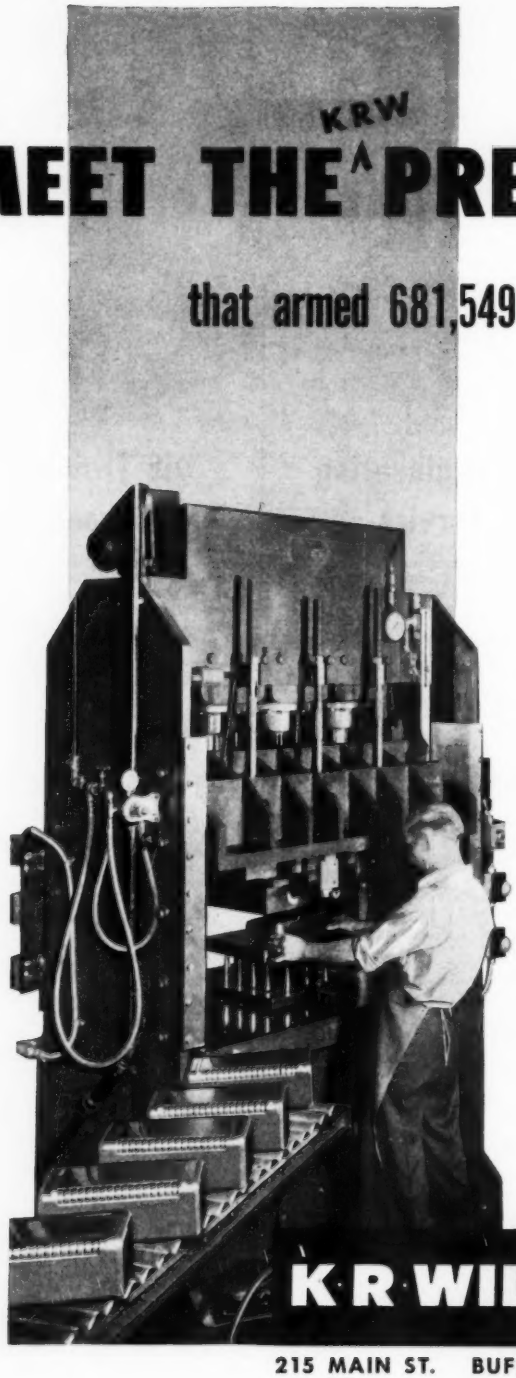
Name _____ Position _____

Company _____ Address _____

City _____ Zone _____ State _____

MEET THE KRW PRESS

that armed 681,549 World War II "soldiers"



Millions of "home front soldiers" won a brave battle for America during the war. Not in the field, but on production lines; not with guns, but with tool boxes! And more than 600,000 of them were equipped with tool boxes from Master Metal Products of Buffalo, N. Y. This is one of the KRW 125-ton Hydraulic presses that did the job. Master Metal tells us they're still going strong!

Talk about versatility and rugged service! You get both in a KRW Hydraulic press. They come in one, two or three cylinder models; either hand operated, air operated or motor driven; 25 to 150 ton capacities. KRW hydraulic presses are self-contained above ground. And they'll do much of the work formerly reserved for heavier, costlier equipment . . . at far less cost.

Need hydraulic presses in your business? KRW can give you immediate delivery. If you need a special press to do a special job, we'll build it for you fast!

KRW hydraulic presses enabled Master Metal Products to eliminate several forming operations and at the same time produce one of the strongest seamless drawn industrial tool boxes on the market. Incidentally, Master Metal is the world's largest manufacturer of sanitary waste receivers. Their famous Sanette receivers are also produced on KRW presses.

K·R·WILSON

Ask your machinery dealer to quote prices or write or wire Dep't 11

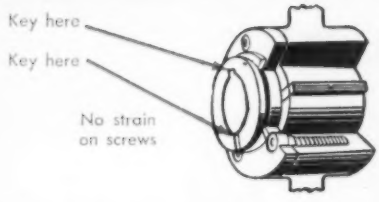
215 MAIN ST. BUFFALO 3, N. Y.

ONE PIECE MOUNTING—Bushing and sheave go on together. Alignment is easy. Sheave is on right first time.

TEXROPE
Greatest Name in V-Belt Drives

This... Not This!

FULL CIRCLE GRIP — Bushing split full length. Collar is separate. Shaft gripped full length around full diameter.



POSITIVE DRIVE — Bushing is keyed to both shaft and sheave. No slipping. No sheared screws. No jammed bushings.

USE FAST-MOUNTING Magic-Grip SHEAVES

Full Grip...No Slip!

MAGIC-GRIP SHEAVE is the fastest mounting sheave you can buy. And you can demount it just as fast. It runs true, will not slip or jam. It always comes off easily without hammering, forcing, or distortion.

Best of all it costs no more than an ordinary sheave. Even if you don't change sheaves often, you should have *Magic-Grip* sheaves on every drive to eliminate the possibility of shaft and bearing damage when ordinary sheaves are hammered or pried on or off. Sizes 1 to 250 hp.

WIDEST V-BELT LINE

You can get everything you need for your V-belt drives from one reliable source. Allis-Chalmers offers the broadest line of V-belts, speed changers, and standard and variable speed sheaves in the industry. And you get the extra engineering skill that comes from having more industrial V-belts, installations than any other manufacturer.

Get the 120 page *Texrope* Pre-Engineered Drive Manual 6956 from your A-C Authorized Dealer or Sales Office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3240

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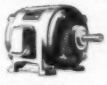
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

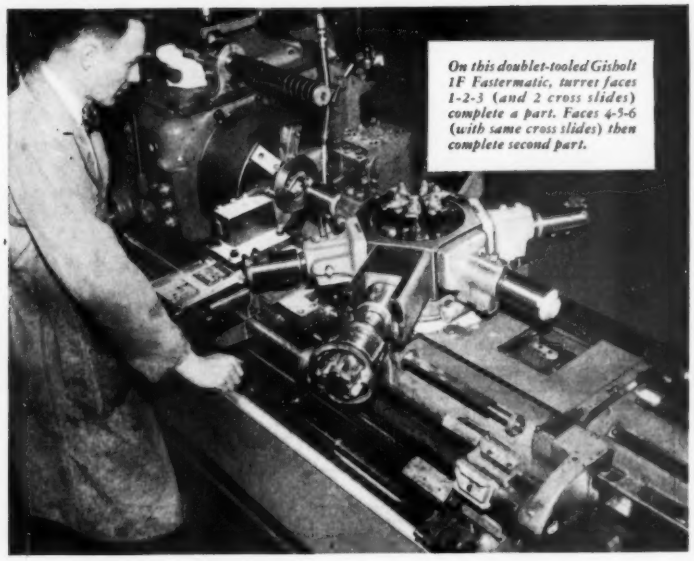


MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

HOW DUPLICATE TOOLING... AND A FASTERMATIC...



On this doublet-tooled Gisholt 1F Fastermatic, turret faces 1-2-3 (and 2 cross slides) complete a part. Faces 4-5-6 (with same cross slides) then complete second part.

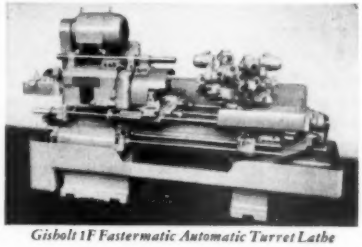
doubled production!

The time *and unit cost* for machining these cast iron pulley flanges were cut in half when the Fastermatic with double tooling took over the job.

Just three turret faces were needed to complete the machining and threading on each part. Therefore, tooling is repeated on the other three turret faces so that *two* parts are finished with each revolution of the turret. Production is doubled over the old method . . . time lag is cut to a minimum . . . there's twice the time between tool changes.

This smart setup illustrates one of the many ways Fastermatic Automatic Turret Lathes give you greater efficiency and lower costs on a broad range of jobs. And one operator can usually handle two or more machines. Ask for the facts.

Floor-to-floor time for these pulley flanges is down to 1.75 minutes. Duplicate tools and collapsing taps on the turret rough and finish the bore, chamfer and cut threads. Front and rear slides shave the angle and form the radius on the O.D.



Gisholt 1F Fastermatic Automatic Turret Lathe

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

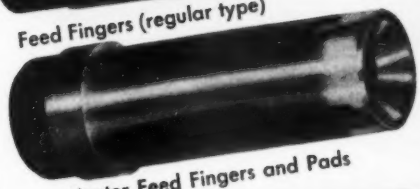
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

HARDINGE
ELMIRA, N.Y.

Engineered for
Brown & Sharpe
machines

FEED FINGERS

Feed Fingers (regular type)

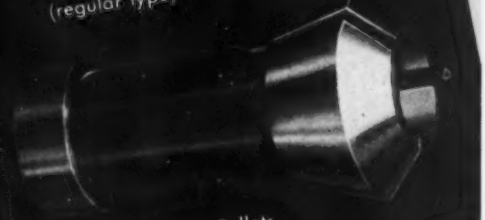


Master Feed Fingers and Pads

Master Feed Fingers with Adjustable Tension for No. 00, 00G, 0 and 0G Machines.

COLLETS

Power Spring Collets (regular type)



Power Spring Collets (taper nose type)

STOP COLLETS

Stop Collet with Adjustable Solid Stop

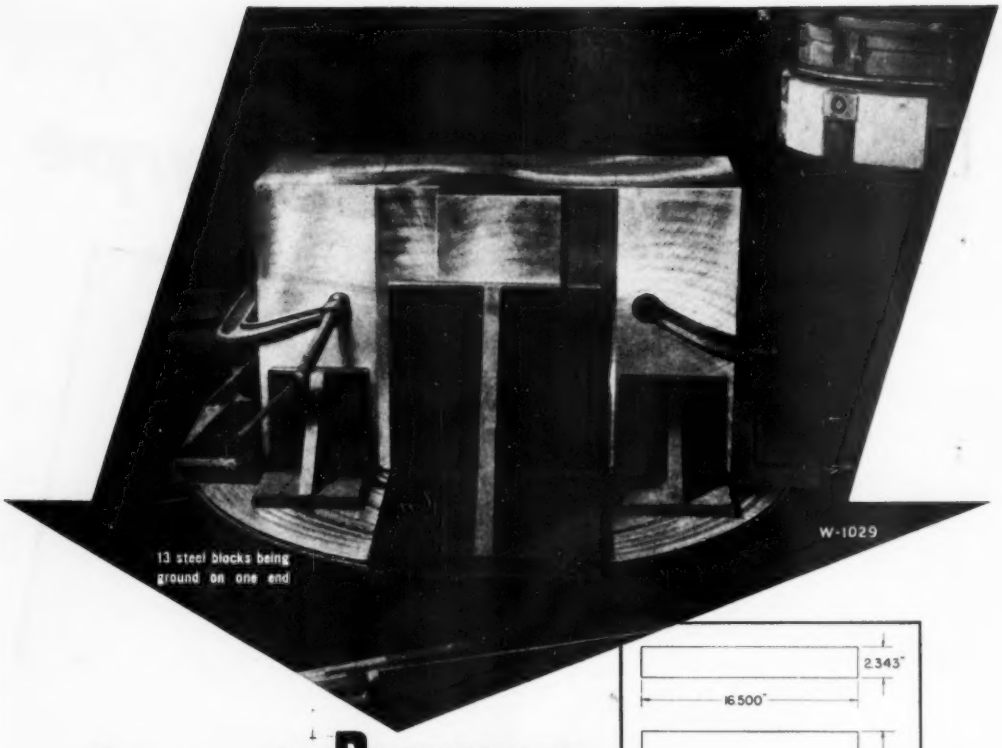
Stop Collet with Adjustable Spring Ejector Stop

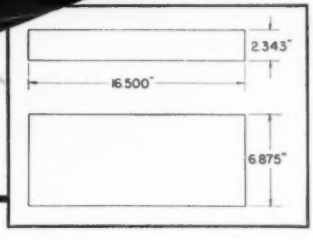
For maximum production efficiency, specify Hardinge precision products for your Brown & Sharpe Automatics and Wire Feed Screw Machines.

Reduce tooling costs and step up production with these and other Hardinge precision products – engineered, customershop tested, and approved for Brown & Sharpe machines.

Write for Calalog 36 — contains complete descriptions, specifications, and ordering information.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.
PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE





Put it on the BLANCHARD

√. . . for stock removal

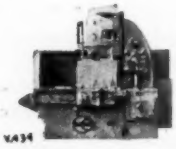
These annealed steel blocks were ground on all 6 surfaces on a Blanchard No. 18 Surface Grinder. Rough size was 16¾" x 7⅛" x 2⅛". *37.439 lbs. of metal were removed from each piece!*

√. . . for speed

Thirty of these steel blocks were ground on all 6 surfaces in 42⅛ hours. *This is a floor-to-floor time of only 85 minutes each.* All surfaces were ground square within .002", and flat and parallel.

√. . . for comparison

Let Blanchard grind some sample parts, or give you estimates from prints of your surface machining jobs. A comparison with your present methods may surprise you!



NO. 18 BLANCHARD SURFACE GRINDER

V-434

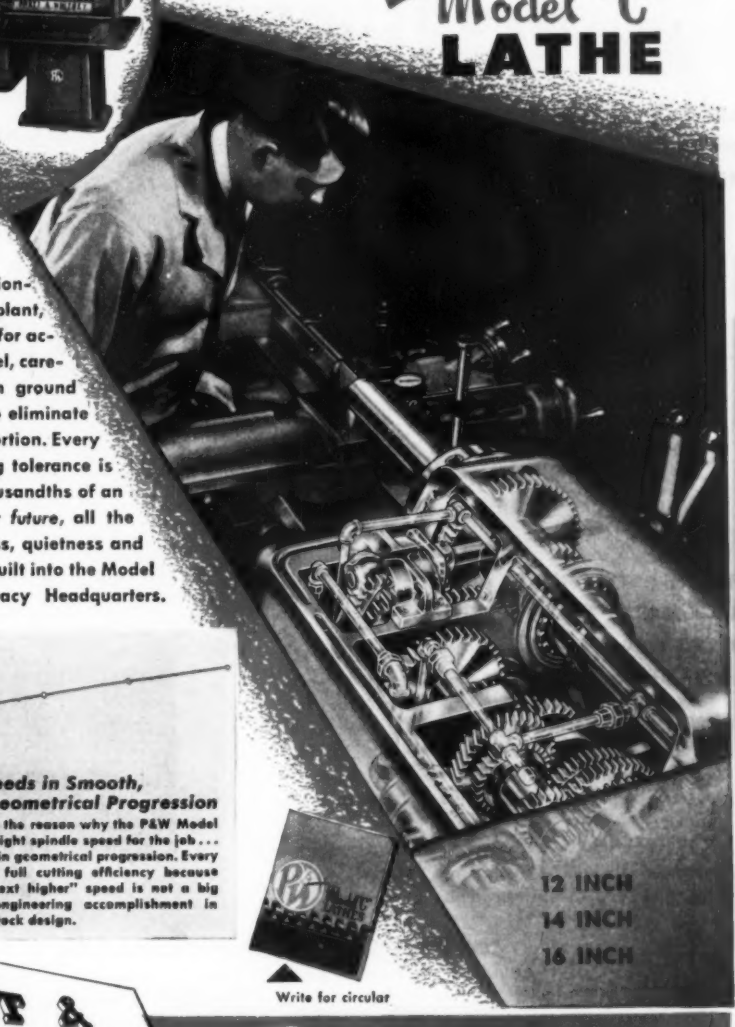
Send for your free copies of "Work Done on the Blanchard," fourth edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE BLANCHARD

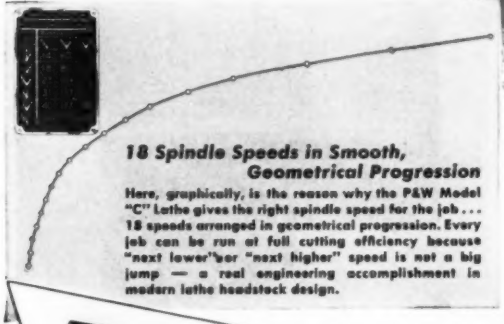
THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

LOOK TO THE FUTURE...

IN THE HEADSTOCK OF THE PRATT & WHITNEY *Model "C"* LATHE



Headstock gears are precision-made right here in our own plant, to our own rigid standards for accuracy. They're all alloy steel, carefully hardened, then finish ground to extremely close limits to eliminate any trace of hardening distortion. Every tooth profile, every spacing tolerance is held to within two ten-thousandths of an inch — to retain, *for your future*, all the inherent power, smoothness, quietness and accuracy that's originally built into the Model "C" right here at Accuracy Headquarters.



18 Spindle Speeds in Smooth, Geometrical Progression

Here, graphically, is the reason why the P&W Model "C" Lathe gives the right spindle speed for the job . . . 18 speeds arranged in geometrical progression. Every job can be run at full cutting efficiency because "next lower" or "next higher" speed is not a big jump — a real engineering accomplishment in modern lathe headstock design.

Write for circular

12 INCH
14 INCH
16 INCH

PRATT & WHITNEY

Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

Model "C" LATHES

The standard by which all fine lathes are judged

Specify *American* Broaches

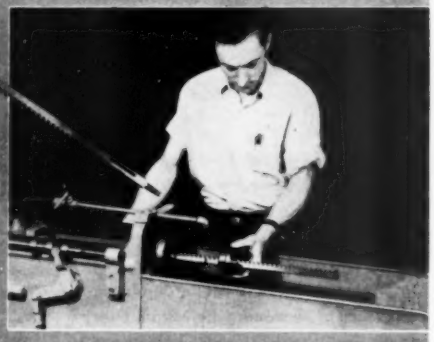
For the best results use American broaches —whether you broach keyways or drive gears.

BROACHING MOTOR COUPLINGS WITH AN AMERICAN STANDARD KEYWAY BROACH

A simple operation yet requiring accuracy is the production broaching of keyways in motor couplings.

In this tooling set up the operator is not required to remove the American keyway broach from the pull head as he threads the part over the broach onto a work horn. High production is obtained as a part is loaded on each return stroke.

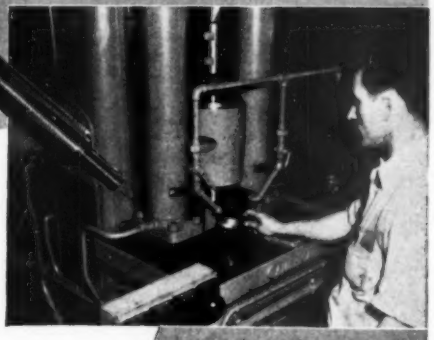
Whether your problem is keyways or complicated involute splines, American broach engineers can design the proper broach to produce parts to your requirements.



FINISH BROACHING AUTOMATIC TRANSMISSION DRIVE GEARS

The prime requirement of automatic gears is silence in operation and long life. American broaches are used to finish the drive gear's helical involute teeth on the American machine shown to the right. No further internal machining is necessary on these gears which must pass rigid tests before final assembly.

Let American quote on your broaching requirements — machines, broaches and fixtures. Send a part print and full information.



COMPLETE BROACHING INFORMATION

Over 5,000 copies of Catalog 450 have been distributed . . . get your copy now of this informative data book on American Broaches. Photographs . . . drawings . . . charts and case histories of broaching tools. Write today for your copy!

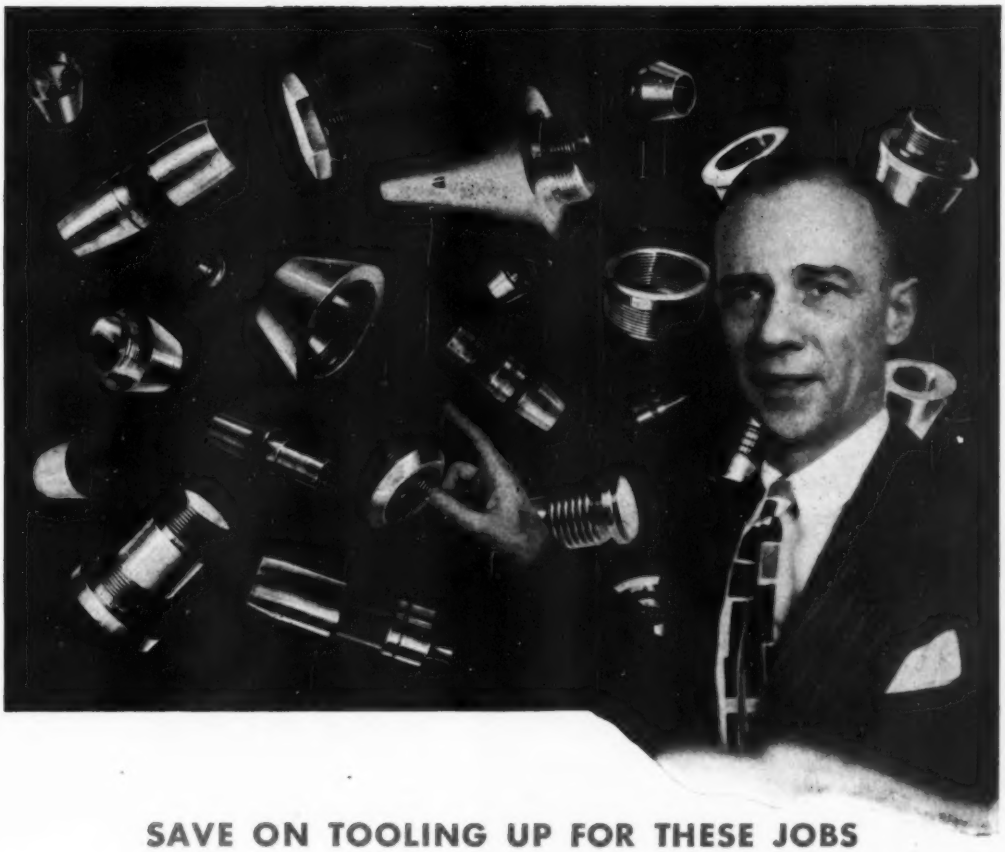
American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

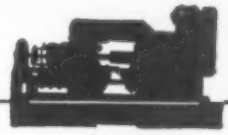


SAVE ON TOOLING UP FOR THESE JOBS

You can save time—and money—on munitions jobs by following the standardized procedures worked out months ago by our staff engineers.

All the necessary preliminary steps for automatic production have been thought out—and *proved* out—in advance. We can give you the standardized tooling recommendations, the times, the tolerances and the methods for almost any standard rearmament part you're planning to make.

With this ready-made experience, your present Acme-Gridley Bar Automatics are ready to swing into action at once—*profitably*. No need for educational orders, trial setups or experimental tooling. Just tell a National Acme engineer what you need. He'll recommend the rest, including the latest developments to give you top performance from your present Acme-Gridley Multiple Spindle Bar Automatics.

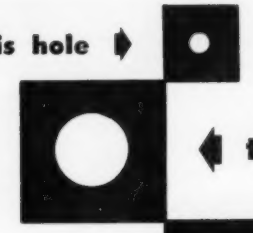


ACME-GRIDLEY BAR and CHUCKING AUTOMATICS built in 1, 4, 6 and 8 spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

THE NATIONAL ACME COMPANY

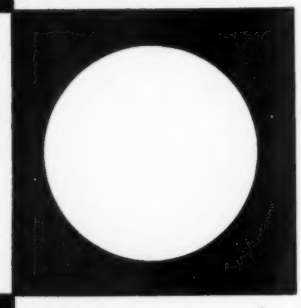
170 EAST 131st STREET • CLEVELAND 8, OHIO

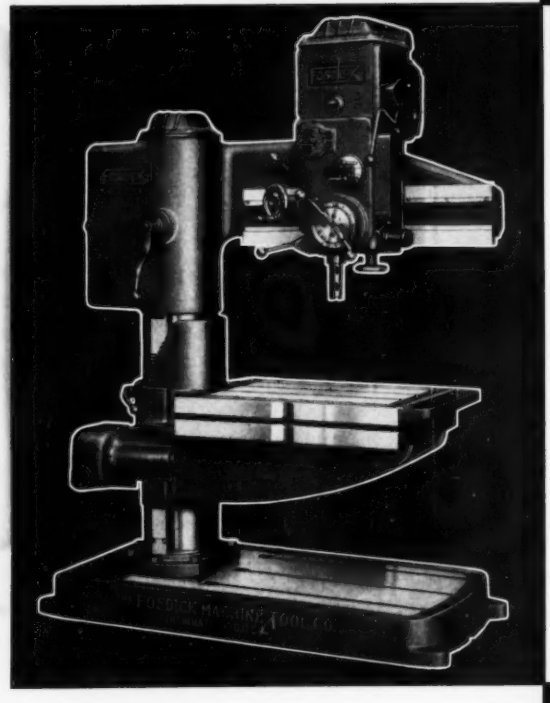
this hole



this hole

or this hole





can be drilled... faster, better and at less cost with a...

FOSDICK *Sensitive* RADIAL

Yes; for holes up to 1½" in diameter you can't beat the FOSDICK SENSITIVE RADIAL.

Its unique design which combines sensitive drilling with radial construction makes it one of the most versatile drilling machines on the market today.

The FOSDICK SENSITIVE RADIAL comes in 3' and 4' sizes . . . Features include a one piece 12" column . . . fixed height arm . . . adjustable table . . . both arm and table swing in a 360° arc . . . the head provides nine speeds and four feeds . . . dials and controls are right at the operator's fingertips.

Write for FOSDICK SENSITIVE RADIAL Bulletin SRA.

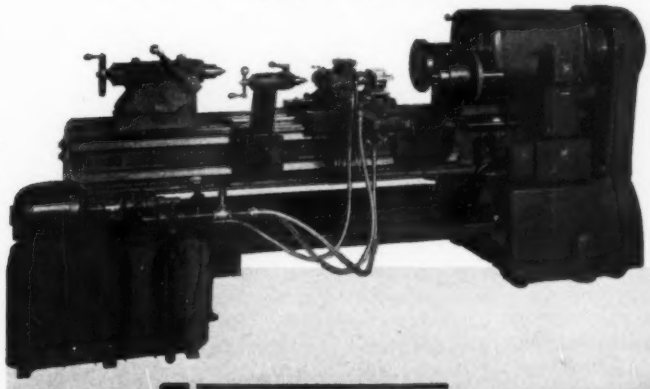
FOSDICK
MACHINE TOOL CO.
CINCINNATI 23, OHIO

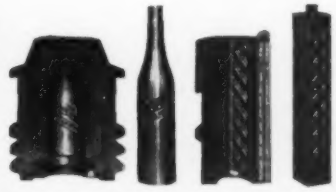
WITH SPRINGFIELD HYDRAULIC REPRODUCER

Now you can secure **accurate** three dimensional contour reproductions with the completely hydraulic, super-sensitive Springfield Reproducer on Springfield Geared Head Lathes. Reproduces internal, external, and face contours using a master, a template or the piece itself. Holds reproduction to extreme limits of accuracy.

Its usefulness and versatility are remarkable—it will trace a compound curve, follow the flats of a square milk bottle, profile and write simultaneously, bring out every detail of the most intricate design, turn a straight, smooth taper on a bar, cut a perfect spiral or a large cam and perform many similar money-saving, time-saving jobs that come up constantly.

Write today for catalog and complete information. We will gladly demonstrate on your work to show what the Springfield Reproducer will do.





Just two examples from many of the accurate reproductions from Springfield Reproducers. Letters and figures reproduced from the master; intricate designs reproduced on flat surfaces.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

ATLAS ROLLER CHAIN

SERVING THE NATION

Coast to coast . . . border to border . . . Atlas Roller Chain and the incomparable Atlas service is available to you through hundreds of progressive, experienced power transmission distributors.

Each and everyone is ready, willing and able to show you how Atlas Roller Chain can help speed your production, cut down your maintenance and increase the utilization of your power.

Atlas Roller Chain is built to give longer service under the toughest operating conditions. The Atlas Nicarb Process of heat treating gives every roller, link, bushing and pin that *extra* life so necessary with today's production goals.

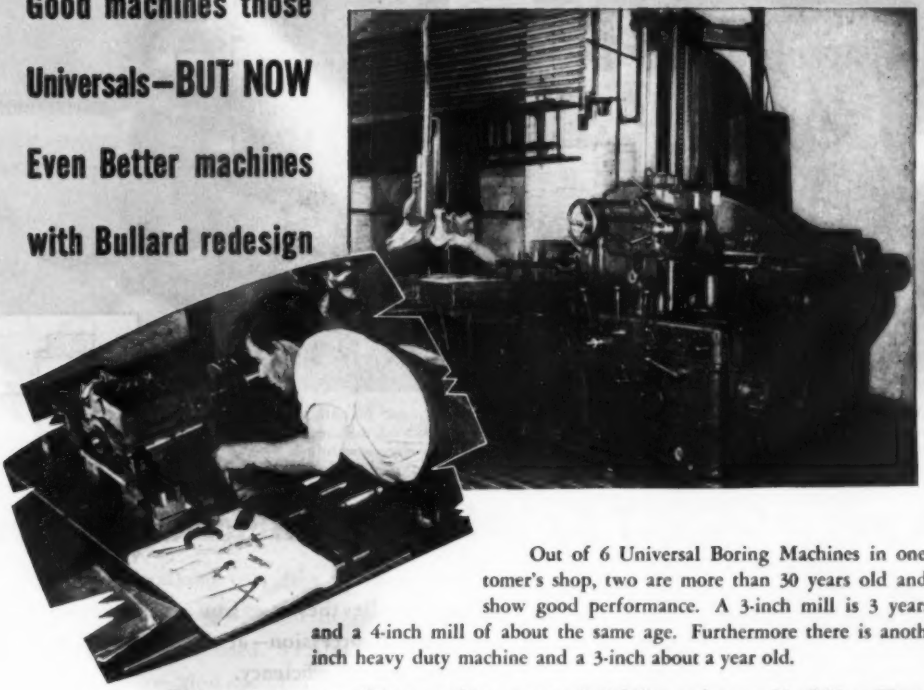
For roller chain that is built to last and service that is aimed to help . . . contact your nearest Atlas distributor. He has the data . . . the know-how . . . and the right size roller chain to speed your production.

ATLAS CHAIN & MANUFACTURING CO., PHILADELPHIA 24, PENNA.

A New Plus to

Consistent Service

Good machines those Universals—BUT NOW Even Better machines with Bullard redesign



Out of 6 Universal Boring Machines in one customer's shop, two are more than 30 years old and still show good performance. A 3-inch mill is 3 years old and a 4-inch mill of about the same age. Furthermore there is another 4-inch heavy duty machine and a 3-inch about a year old.

The customer says — "These machines possess Reliability and great Flexibility. They meet our requirements because our work is so diversified and yet we require a very accurate machine for back boring, which is a complicated operation done accurately on these machines."

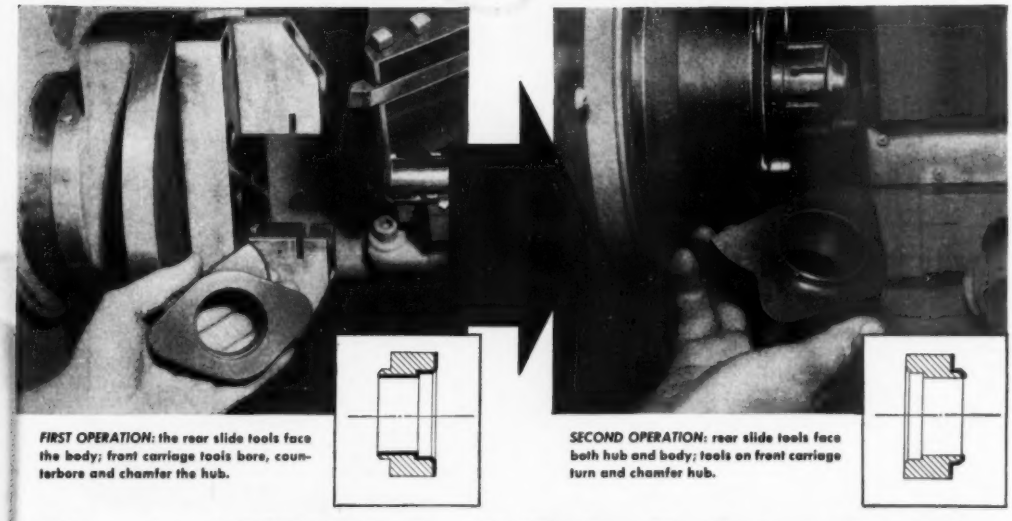
The foregoing bespeaks Consistent Service from the old line of machines. NOW the new heavier design with 4-WAY BED, features providing longer useful life with maintained Accuracy, hydrodynamic main drive with brake motor, Traybon lubrication system for ways and external bearings make Bullard Horizontal Boring, Milling and Drilling Machines an important item for your very earnest consideration.

THE BULLARD COMPANY · BRIDGEPORT 2, CONN.

Ask a **BULLARD** representative to outline the application of a **BULLARD** Horizontal Boring Mill to your work.

Quick "pass-along" idea

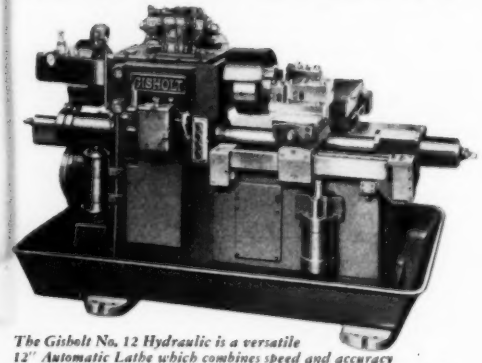
INCREASES PRODUCTION



FIRST OPERATION: **the rear slide tools face the body; front carriage tools bore, counterbore and chamfer the hub.**

SECOND OPERATION: **rear slide tools face both hub and body; tools on front carriage turn and chamfer hub.**

with pair of GISHOLT No. 12 Hydraulic Automatic Lathes



The Gisholt No. 12 Hydraulic is a versatile 12" Automatic Lathe which combines speed and accuracy with easy setup. Ideal for both chucking and between-centers work.

One operator with two standard machines now handles these cast iron manifold bodies in rapid succession—at a pace of 80-per-hour, at 80% efficiency.

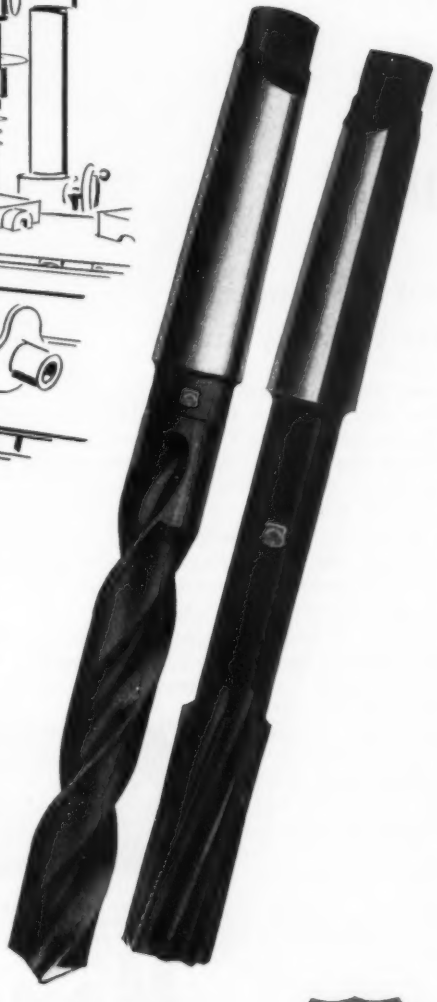
This two-machine team pays off many ways: The operator loads and unloads one machine while the other is working—*automatically.* Investment is at a minimum because both machines *and* tooling are standard. Tool setups and replacements are simple.

Whether you have continuous runs like this or even smaller job lot work—the speed and automatic operation of the Gisholt No. 12 Hydraulic may be your answer to lower costs. It's worth investigating.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



PRODUCTION jobs are not delayed where Red Shield Drills are used. STANDARD tools are uniform in construction and operating characteristics. Their production is fast—economical—dependable.

Standard "Red Shield" Service Men are always available to give you the benefit of our 70 years' of accumulated experience in mastering tough cutting tool jobs.

STANDARDIZE and save on drills, reamers, taps, dies, milling cutters, end mills, hobs, counterbores, and special tools. Sold by leading Industrial Supply Distributors coast to coast.

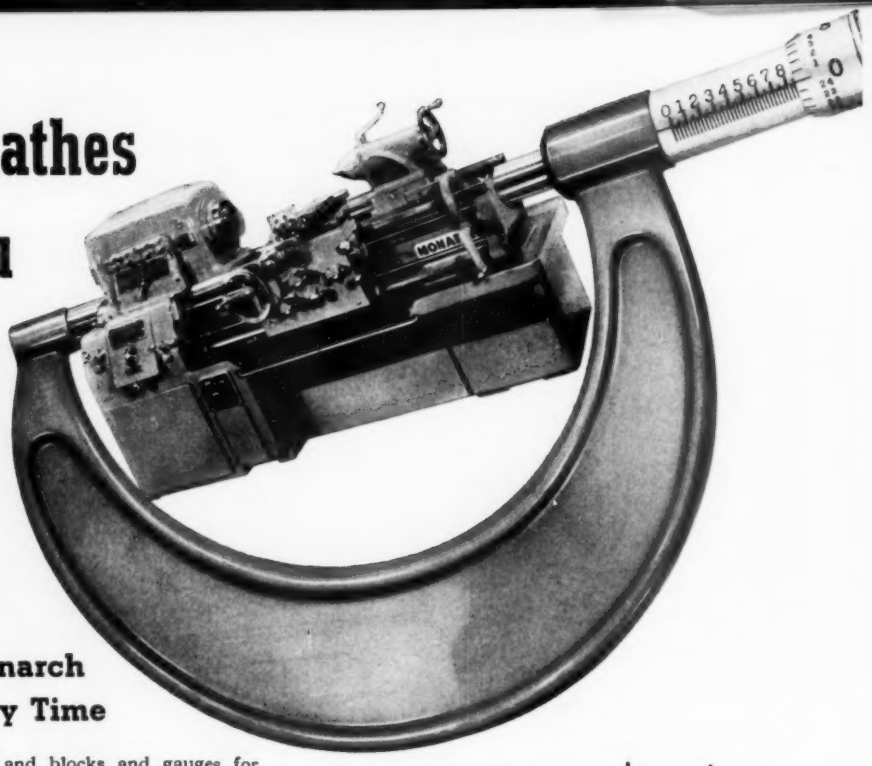
STANDARD TOOL CO.

3950 CHESTER AVENUE
CLEVELAND 14, OHIO

New York • Detroit • Chicago • San Francisco

THE STANDARD LINE: *Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special Tools*

Check Lathes Like You Check Their Output



...and it's Monarch Series 60 Every Time

You have your mikes and blocks and gauges for checking lathe production. But what kind of test is there for the lathe itself? How can you gauge its performance *before* you buy—at the time when you're establishing the standards for the quality and costs of your entire operation?

This way! Lathe performance is only a reflection of the quality built into a lathe—of its features of design and construction. *So check features*—and check them against the handy yardstick here.

Check, too, the strength, weight and power built into each machine. You not only find every desirable construction feature in the Monarch Series 60—you'll find that *almost every one of them was originated* by Monarch. Doesn't that make the Monarch Series 60—Toolmaker's and Engine Lathes, both—the standard that you're looking for? Write for Bulletin 1113, and see for yourself . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

LATHE FEATURE CHECK-LIST	MONARCH	LATHE B
1 Totally enclosed gearbox and end gearing—for sustained accuracy	Yes	?
2 Automatic pressure lubrication—for long life at original efficiency	Yes	?
3 All anti-friction bearings—for peak power and reduced maintenance	Yes	?
4 Hardened, ground or shaved, wide helical gears in headstock—for precision power, easier shifting	Yes	?
5 American Standard Camlock Spindle Nose—for quick, rigid chuck and fixture mounting	Yes	?
6 Flame-Hardened and Precision-Ground Integral Bedways—for sustained accuracy throughout the life of all four ways	Yes	?
7 All critical parts made of hardened alloy steel—for long, trouble-free life	Yes	?

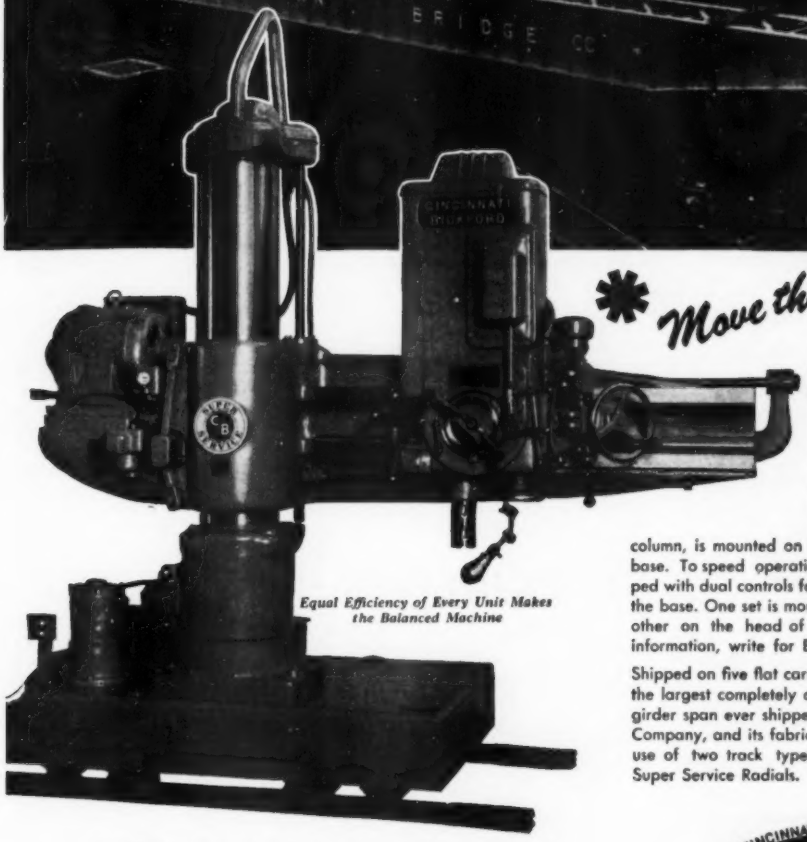
Your proof of protection on all Series 60 Toolmaker's and Engine Lathes, available in 12", 14", 16" and 20" swings—each in various lengths. Most can be equipped with either one of the three Monarch Tracer Controls.

Monarch
TURNING MACHINES

ACCURACY • ECONOMY • LONG LIFE

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

DRILLING LARGE WORK?*



Equal Efficiency of Every Unit Makes the Balanced Machine

* Move the machine!

At the American Bridge Company, a U. S. Steel Corporation Subsidiary, drilling many large and cumbersome parts, this CINCINNATI BICKFORD SUPER SERVICE 5' arm 13" diameter column Radial with bailing hook on column, is mounted on a 36" gauge track type base. To speed operations, this machine is equipped with dual controls for traversing and clamping the base. One set is mounted on the base and the other on the head of the machine. For further information, write for Bulletin R-29.

Shipped on five flat cars, the 162' 150 ton span is the largest completely assembled continuous deck girder span ever shipped by the American Bridge Company, and its fabrication was speeded by the use of two track type base Cincinnati Bickford Super Service Radials.

Good judgment in selecting the proper machines, tools, and fixtures will consistently produce the best manufacturing results. Our CUSTOMER PRODUCTION ENGINEERING SERVICE in the metal drilling field represents the collective experience of many years (since 1874). Make your problems ours - - let us show you a profitable Radial or Upright Drill production application. Your most urgent production problems warrant our immediate attention.

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE CB

Radials 7½" dia. col. 2½' arm, to 26" dia. col. 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio

TRY THIS *cost-cutting team* **for CARBIDE GRINDING**

Wickman Steel-Bonded Diamond Wheels practically indestructible with extra long life. Diamond particles stay in place until completely worn. Finish tools better for longer tool life.

Wickman Resinoid-Bonded Diamond Wheels for faster and freer carbide cutting and less frequent wheel dressing.

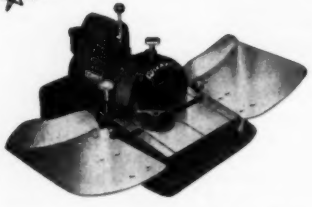
Wickman Chip-Breaker Diamond Wheels steel-bonded for much longer life than other chip-breaker diamond wheels. Reduce wheel and tool costs materially and speed grinding 3-4 times.

Complete facts in free 52-page catalog.

•

Grinding with Diamond or Abrasive Wheels is

☆FAST! ☆ECONOMICAL!



on the Wickman GF-2-A

With 1 HP reversible motor and impeller-type 12 gph coolant pump, this heavy bench grinder delivers fast, economical grinding with both silicon carbide abrasive wheels and Wickman steel-bonded diamond wheels. Wheel guards and splash protectors, three position table for wheel wear adjustment, plus a protractor slot for angular grinding, make this the ideal grinder for all off-hand grinding around the shop.

Delivery From Stock. Send for bulletin.

THE **Wickman** MANUFACTURING CO.
15533 Woodrow Wilson Ave.
DETROIT 3, MICHIGAN

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Hire Young Executives

I note (*AM*, Jan. 8, p156) you are having difficulty in getting suitable young college-trained mechanics, in order to step up the number of supervisors requisite to your rearmament drive. I have been through both wars as a high-up in three different English plants. I imagine that it would be correct to say that you are now beginning to feel the effects of over-specialization.

The best place to look for your budding executives is in your toolrooms—that is, if you have not carried the same sort of specialization there also to excess. I have been a toolroom superintendent for many years in and around London, and my policy was to regard the tool-engineering department and the toolroom as the very heart of the productive machine. As one who engaged many hundreds of skilled mechanics and fired very few, my own observation is that the hirer must have broad human sympathies, an insight into human nature, and be a psychologist to boot.

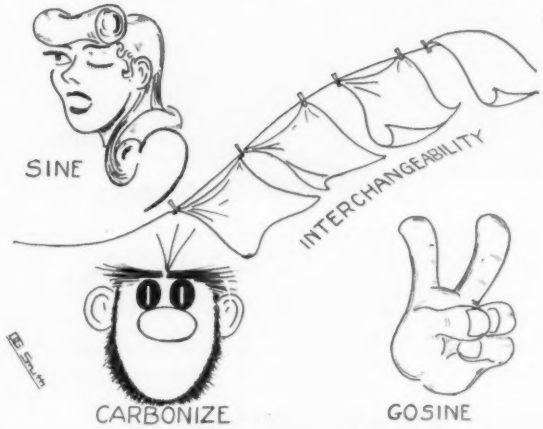
If you select the right men and boys (and here some personal acumen comes in), and having got your working force, keep them all—especially the juniors—interested by giving them jobs that will test their mettle, provided always that they have shown enthusiasm and interest in their jobs. Then, when a national crisis arrives, you have no dearth of candidates to select from. You will find that when more confidence is placed in them, they will rise to the occasion and you will get all the young executives you need.

It has been said that one gets the kind of people that one has trained: or in other words, the young men coming along are, as it were, a reflex of the people who train them. I believe this to be profoundly true, for to get results one must be at all times an example to one's juniors and have a personality that gives confidence to those over whom one may have to rule.

In that case, I always say that one must have an iron fist in a velvet glove. You won't need to use the iron fist much, but it is necessary to have it there, and know how to use it. To prove that it is not necessary to use it very often, I may say that many of my old boys of 30 years ago correspond with me yet—three of them have plants of their own.

GRINETICS

BY D. G. SMITH



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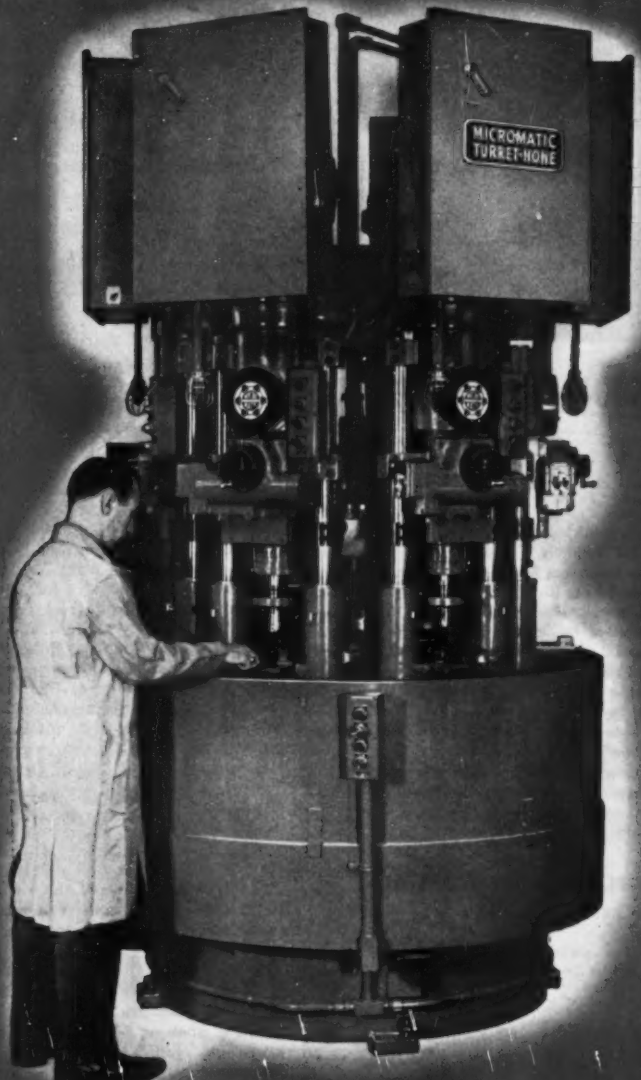
NEW *High Production ★ High Precision* TURRET • HONE



SIX MICROHONING UNITS

One Machine
One Operator

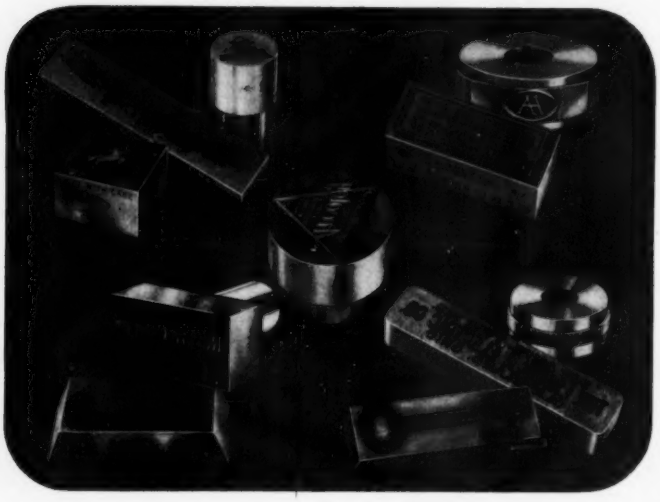
THIS new model 736-6 TURRET-HONE finishes a part every five seconds. The operator unloads and loads the fixtures as they pass the control station. As the loaded fixture leaves the control station it automatically lifts into position, the tool starts rotating, reciprocating and expanding. The machine rotates continuously. When the part is "to size" the automatic MICRO-SIZE control stops the tool and drops the fixture. As the fixture passes the operator again, a new part is loaded and the cycle continues. This is repeated on each unit.

Micromatic Hone Corporation 8100 SCHOOLCRAFT AVENUE DETROIT 4, MICHIGAN

MICRO MATIC

District Field Offices: 1323 So. Santa Fe., Los Angeles 21, California • 614 Empire Building, 206 So. Main St., Rockford, Illinois
55 George St., Brantford, Ontario, Canada • Micromold Manufacturing Div., Boston Post Road, Guilford, Connecticut

A MARK IS ONLY AS GOOD AS THE DIE THAT MADE IT



NOBLEWEST PRECISION MARKING DIES

Last Longer—Give Better Impressions

for

MARKING
★
GRADUATING
★
NUMBERING
★
KNURLING
★
EMBOSSING
★
DEBOSSING

Noblewest makes dies for marking practically every type of surface, including round, flat, concave, convex and irregular contours. Noblewest dies are of one quality—the finest that human skill and every modern technical facility can produce. Noblewest dies for marking designs, names, addresses, trademarks, numbers and graduations have become the standard for clear impressions and longer life—*yet they are competitively priced.* Noblewest dies are made of specially selected steel, precision engraved to extremely close tolerances, and treated for extra long wear. Every Noblewest die is rigidly inspected and Rockwell tested for hardness. Large facilities permit prompt delivery. Send detailed specifications on your requirements and we will gladly submit quotations. The Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford 8, Connecticut.

NOBLEWEST DUPLICATE DIES

Easily ordered by number

As a service to our customers we will gladly serial number your Noblewest dies when requested. Exact duplicates can then be ordered by number only.

MARK IT BEST WITH NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

So it would seem that the shortage is mainly a result of faulty supervision and training.

J. P. Essex
Hove, England

•

Grinlin Family Tree

I see that my "Grinlins" have become "Grinlings" (*AM*, April 30, p 98). Perhaps you'd like a short history of the Grinlins. Actually, it goes back to the discovery of the Gremlins during World War II. This genus, however, seemed quite unphotographable, and no two artists ever saw the same ones—at least, no two Gremlins looked alike. During the latter part of the war and in the few years following, the existence of some type of troublemaker became more and more apparent (some fool efficiency expert had a theory about mental letdown due to the war's ending).

It was during this period, while working on the design and malfunction of some gadgetry and special mechanisms, that I personally made direct contact with what I supposed were Gremlins. After a long period of study, experiment, and comparisons, I was finally able to simulate a portrait. Too late, I discovered an unforgivable mistake upon my part: The little fellows were Grumlins, a different branch of the genus Gremlin, being of superior intelligence, more active, and better organized, with habitat confined to Grumman Aircraft Engrg Corp.—at least we think so.

Shortly afterwards, Grumlins appeared everywhere. A company of about 100 attacked an inboard profile drawing of one of the airplanes . . . after the pilot was released from the hospital, we presented him with the drawing.

Whenever a Grumlin popped up, I got the blame. One little guy caused me no end of trouble, insisting upon sitting upon an I-beam in the bomb bay and reading a newspaper. He'd appear on blueprints, but not on the original drawing. It required considerable detective work to discover that he had been drawn with a white pencil on the back of the original drawing. Since this incident, there has been a truce between us; I leave them alone and they don't bother

Just 1/2 the time...

PREVIOUSLY...

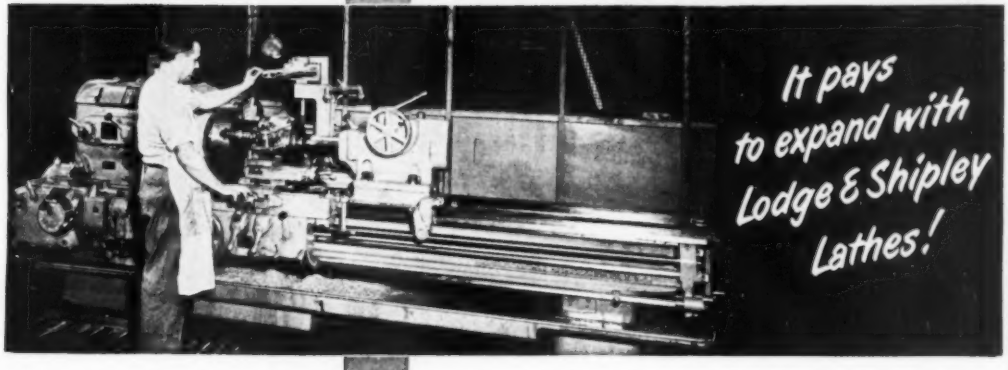
TWO MEN...

TWO LATHES...

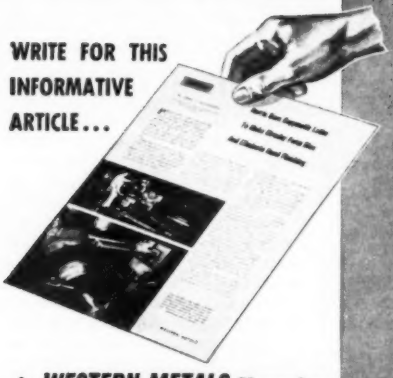
NOW...

ONE MAN...

ONE LODGE & SHIPLEY COPYMATIC



WRITE FOR THIS INFORMATIVE ARTICLE...



in *WESTERN METALS* Magazine
Written by
JOHN C. BUCHANAN
V.-P. in Charge of Mfg.
Norris Stamping & Mfg. Co.
Los Angeles, Calif.

...a reprint of Mr. Buchanan's full length article describing in detail methods and savings obtained with the COPYMATIC on this job is available on request.

Featured in an article in Western Metals magazine, here's another highly successful COPYMATIC installation: Saves 50% on production time . . . "one man handles all the jobs on the COPYMATIC," saving not only manpower but also time and tied-up machinery. "In addition, we realized greater accuracy," says John C. Buchanan, Vice President of Norris Stamping and Manufacturing Company, Los Angeles, California, in this article.

The Copymatic Lathe is used by Norris to machine and redress high-chrome, high carbon auto rim rolls with the unbelievable hardness of 62 to 65 Rockwell C.

The Lodge & Shipley COPYMATIC proves itself to be as productive on automatic duplicating as it is versatile on engine lathe work. Changeover from one to the other is instantaneous. There are no attachments or gadgets to put on or remove. Flat or round templates may be used for fast automatic production of any number of parts.

The double advantages of the COPYMATIC . . . ease and speed of hydraulic duplication plus Model X engine lathe versatility . . . make it a profitable producer for any size shop. Our engineers will show you what it can do in your shop. Write for detailed literature now.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

NEW PRINCIPLE of GUIDEROL

...solves your TOUGHER bearing problems

The McGill GUIDEROL Roller Bearing is especially designed to take advantage of the greater capacity of cageless roller bearings — without the danger of roller skewing. This new principle of construction features guided rollers that overcome skewing tendencies and eliminate the need for space wasting cages and excess internal looseness. Load capacity in cylindrical roller bearings is not only increased with Guiderol Bearings but this advantage is effectively applied to faster and more precision applications—not before possible with full type cylindrical roller bearings. You will profit by investigating these and many other advantages of Guiderol Roller Bearings.

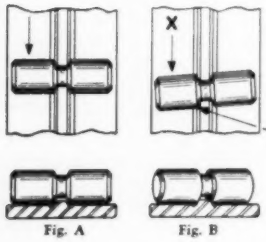


Fig. A Fig. B

GUIDED ROLLERS PREVENT SKEWING — BINDING

A guide rail on the inside diameter of the outer race maintains roller alignment. Normally no correction is required. Should misalignment cause tendency to skew, the guide rail touches grooved rollers back into position by momentary contact at Y. X indicates direction of roller rotation.

Bulletin GR-50 lists proposed standard sizes in CT Series (interchangeable with cylindrical type dimensions) and FT Series (interchangeable with ordinary needle type dimensions). Write McGill Manufacturing Co., Inc., 111 N. Lafayette St., Valparaiso, Indiana for your copy.

McGILL® precision bearing

me—any more than they do other people, that is.

Meanwhile, I've been able to make contact with the Grinlins, who seem to be a little more congenial—so far, that is. I hope they didn't mistake me for one of themselves. The Grinlins (technically, *homo grinlin*) are spread far wider and outnumber the Grumlins. Generally, they are found throughout industry and are not too vicious. A few will even find interests outside industry. They have developed along with *homo sapiens*, and seem to mimic him. Well, that's the history—until you change their name.

DONALD G. SMITH

We thought all the time it was "Grinlin," but the typewriter and the linotype made it "Grinling." The change was discovered just before the presses rolled, and we sent a corrected proof to the printer. We were assured the spelling would be corrected —but then a type louse, apparent close relative of the Grumlin, loused things up.—ED.

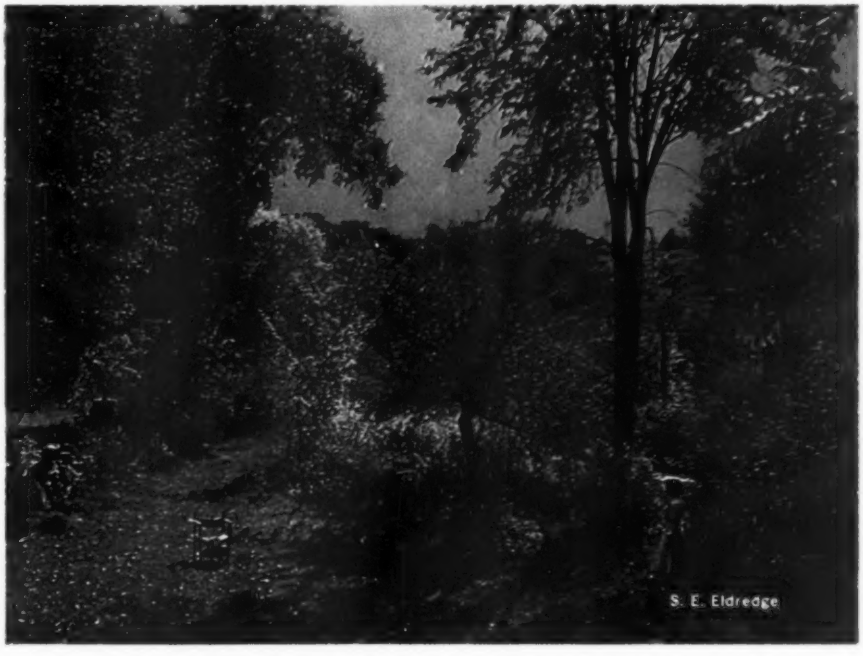
Loosening Adhesives

C. O. T. Bolling, in closing his interesting article on Double-Coated Adhesives (*AM* April 16 '51, p 143) for attaching nonmagnetic parts for machining states, "In fact, it may be necessary to pry off the part with a wedge-shaped tool if the part is thin. Larger parts can be bumped or pulled off."

As a matter of fact, thin parts can be easily bent or damaged; and thick, soft parts are marred by such treatment in removing them from the holding base. This difficulty is readily overcome by squirting a small amount of carbon tetrachloride (nonflammable cleaning fluid) around the edge of the part with a medicine dropper and allowing a short time for the fluid to penetrate and dissolve the adhesive.

There are many other solvents which will answer the purpose, any of which might be handy in most shops.

L. de L. Berg
West Hartford, Conn.

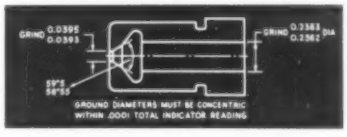


*What's in Vermont this month?**

SPECIAL MACHINE FINISH GRINDS INJECTION NOZZLE

Finishing fuel injection nozzles presents a unique group of internal grinding problems. The parts, as a rule, are small and demand extreme accuracy. There are three surfaces to be traverse ground and each one presents its own problem. First, the main bore, which is only .2363 inch in diameter has a seven to one ratio of diameter to length. Second, the tapered seat located at the bottom of this bore is to be traverse ground to an angular tolerance of one minute. Third, the .0394 inch hole, because of its exttemely small size, demands grinding wheel speed far in excess of anything previously available. Fourth, a one-tenth concentricity is to be maintained on all three surfaces.

The Bryant Chucking Grinder Co. of Springfield, Vermont, has developed the No. 1309-W internal grinder for finishing injection nozzles at one chucking. Outstanding features include preloaded ball bearing slides for rigidity, an auxiliary angular slide for traverse grinding the tapered seat, Hi-Frequency wheelheads for

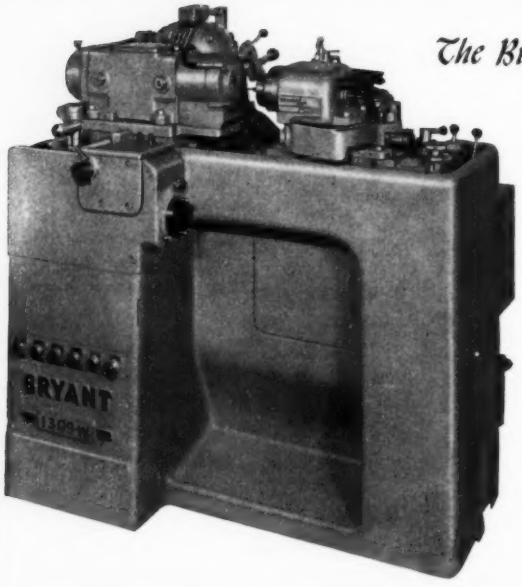


speeds up to 100,000 R.P.M., and a precision workhead indexing from one wheel to the other to maintain concentricity. Some specifications for this machine may be found on the back of this page.

* Remember . . . it won't cost to inquire!

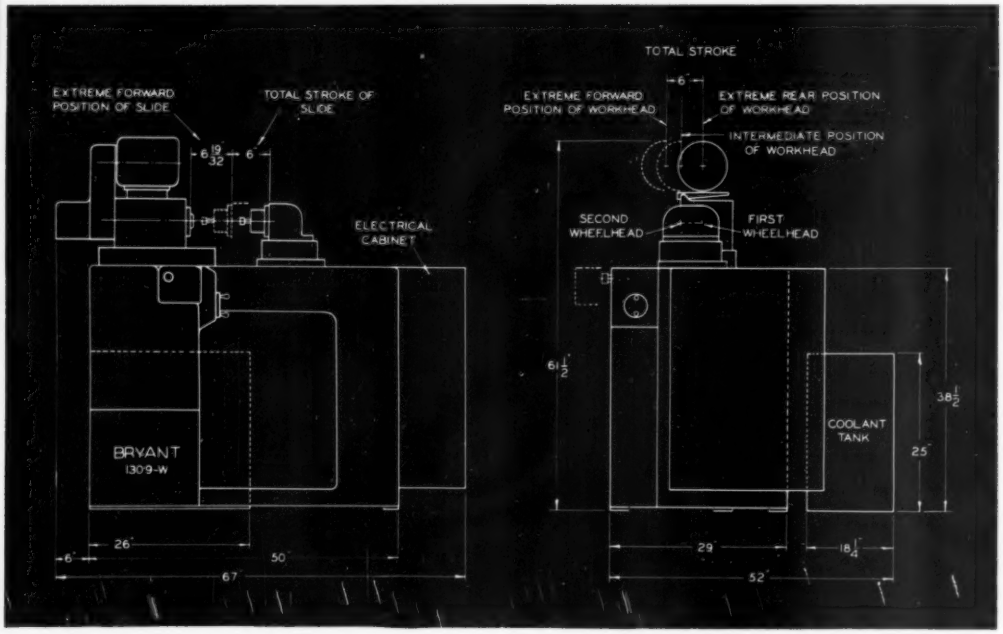
Bryant Chucking Grinder Company in Springfield, Vermont, U.S.A.

FOR HOLE GRINDING

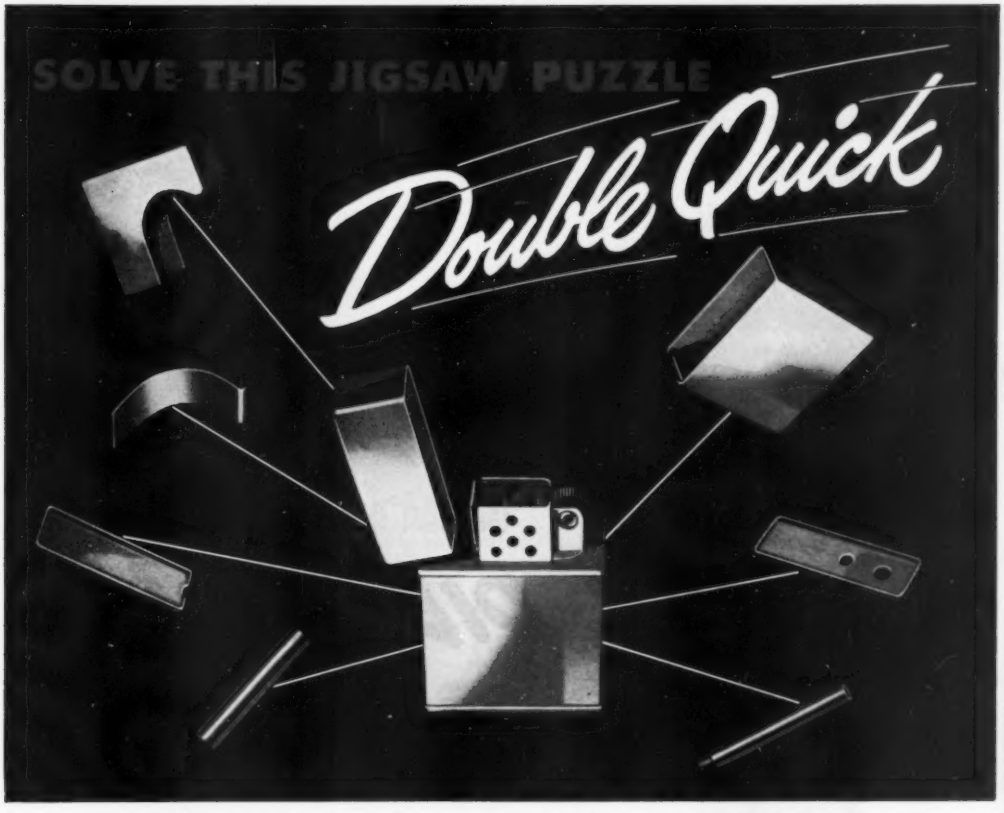


The Bryant 1309-W Precision Hole Grinder

This precision machine is semi-automatic, and is used for finishing two bores and a taper in a single chucking of the work piece. The No. 1309-W is ideal where straightness and concentricity are imperative. Each bore is traverse ground separately and size is controlled by a calibrated dial. The taper is traverse ground to assure a clean seat free from concentric grinding marks as produced by a plunge cut. Accurate angular control is assured by an auxiliary preloaded ball slide. Two wheelheads are used and the work is indexed from one to the other. Wheel speeds up to 100,000 R.P.M. are available on either or both wheelheads. The No. 1309-W has a total chuck swing of 9 inches, and a maximum grinding length of $3\frac{1}{2}$ inches.



Bryant Chucking Grinder Company in Springfield, Vermont, U.S.A.



with TOCCO* Induction Soldering

The American Emblem Co. wanted to speed production, cut costs and reduce rejects in the assembly of their "Ruliter" Cigarette Ignitors. Look what happened when they switched from hand soldering to automatic TOCCO soldering!

COSTS DOWN—Solder cost reduced 50%—repairs and rework due to misalignment of parts cut 98%.

PRODUCTION UP—A 7½kw 9600 cycle TOCCO unit with conveyor type fixture heats one assembly every 20 seconds—twice the former output.

REJECTS ELIMINATED—Formerly rejects due to leaking seams and uneven heating were frequent. TOCCO has eliminated these completely.

TOCCO ENGINEERS—are glad to survey your soldering, brazing, hardening or forging requirements to see where TOCCO can save you time and money, too.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. B-5, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Brazing and Soldering".

Name_____

Position_____

Company_____

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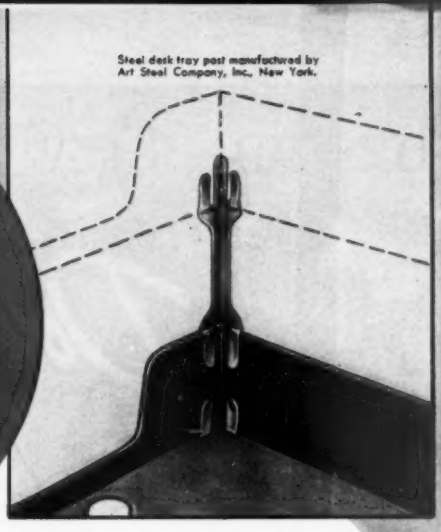
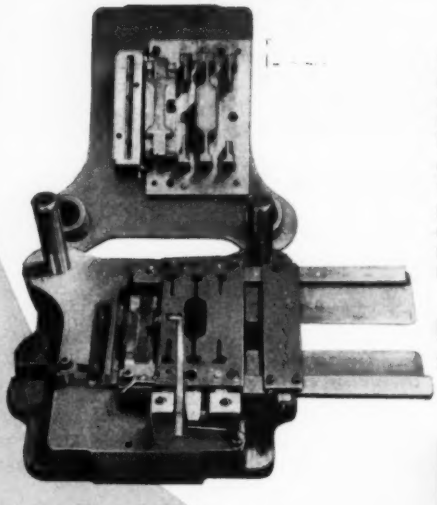


Steel desk tray post manufactured by Art Steel Company, Inc., New York.

they built the die in a

DANLY DIE SET!



Dependable, long wearing dies are a must in stamping the desk tray posts shown above because of volume production requirements. The dies have to be sturdy, too, to withstand the combination of high speed operation and heavy stock.

That's why Art Steel Company, Inc., of New York, chose a Danly Die Set. Outstanding performance in jobs like this has made them the first choice of die makers everywhere. Just call your nearest Danly Branch Assembly Plant* for quick attention to *your* specific die set needs.

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

PRECISION DIE SETS . . . STANDARD AND SPECIAL

***WHICH DANLY BRANCH IS CLOSEST TO YOU?**

Danly Branch Offices: *Chicago 50, 2100 South Laramie Avenue • *Cleveland 14, 1550 East 33rd St. • *Dayton 7, 3196 Delphos Ave. • *Detroit 16, 1549 Temple Avenue • *Grand Rapids, 113 Michigan Street N.W. • Indianapolis 4, 5 West 10th St. • *Long Island City 1, 47-28 37th St. • *Los Angeles 54, Decommun Metals & Supply Co., 4890 South Alameda • Milwaukee 2, 111 East Wisconsin Ave. • Philadelphia 44, 18 W. Chelten Ave. • *Rochester 4, 16 Commercial St.

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DANLY

More than 25 years of dependable service to the stamping industry

SPOT NEWS of Metalworking

- **200 above-ceiling wage agreements, covering 54,000 workers,** are claimed by Machinists' Union (AFL) to be among the 1200 wage-increase applications awaiting approval of Wage Stabilization Board. Fact is that 2.5 million workers are covered by cost-of-living escalators. Of that number, almost 1 million have a deferred wage increase coming this year, and nearly as many have contract wage reopenings.

- **Scientists hope to find out by use of isotopes more about exact way** in which metals slowly change under high temperatures, and perhaps to develop new alloys which show less "creep," Harry A. Winne, General Electric vice president in charge of engineering policy, told New England regional meeting of American Society for Metals.

- **Stainless steel knitted wire pads unaffected by low temperatures** at high altitudes are being substituted for rubber in aircraft vibration-damping equipment. Rubber equipment has been failing, because the rubber became brittle and hard with the extreme cold.

- **British exported to Soviet Russia over $800,000 of machine tools during March.** That compares with some $120,000 in the same month a year ago. Russia was the largest recipient by far of British machine tools. Next largest foreign customer in March was Canada, with $492,000.

One West Coast company is trying to lure machinists and toolmakers from New York area with these inducements: air-conditioned buildings to work in; new machine tools to operate; substantial premium overtime; "personnel review" every four months; beaches, mountains and commercial districts within easy reach, providing the "attractive California way of life."

- **Aircraft equipment maker is spending twice the manhours** in machining the same parts which it made prewar. Reason: the meticulous 100% inspection now required by armed services officers. On one small item 18 individual inspections are specified.

- **The practice of big prime defense contractors** of installing stamping equipment of their own is causing concern among independent metal stamping shops. This situation is almost identical to the one which developed on screw machine products during World War II.

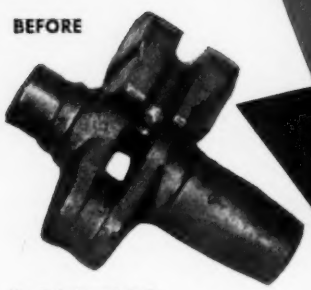
- **Western Germany's striking industrial recovery** was shown at the Hanover Fair early in May. There were 2645 exhibitors, of which 327 displayed machine tools, 135 woodworking machines and 102 measuring equipment and small tools. 148 exhibitors were from outside Germany.

Midwest manufacturer recently got 500 tons of steel billets from France for conversion rolling in this country. French government held up further tonnage, however, unless considerable percentage of the French steel would be processed into final products for shipment back to French purchasers.

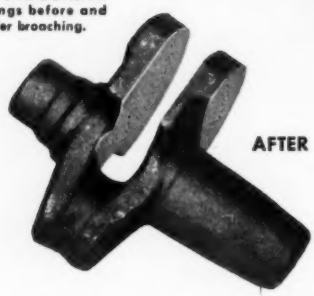
- **Three-inch steel bars have been machined down to make special tools** normally shaped from one-inch bars by an Illinois company desperate for enough steel to keep going. Management has gone so far as to order 35 tons of SAE6145 steel from Germany, paying 7 cents a pound premium which will have to be absorbed because it cannot be included in prices.

- **100 small manufacturing companies in Omaha, Neb.,** have formed Omaha Industries, Inc., which is first production pool approved by DPA to speed defense work. Each firm pays membership fee, employs average of 52 workers. Pool excludes commercial business. Metalworking fabrication and machine shop facilities are included in pool's resources. Persons desiring to form similar pools can secure approval by contacting Pooling Section, Procurement Assistance Division, Office of Small Business, National Production Authority, Washington 25, D. C.

BEFORE



Small steel crankshaft forgings before and after broaching.



AFTER

A WINNING COMBINATION:

BROACHES AND FIXTURE BY CONTINENTAL

CUT 2-5/16" DEEP AT RATE OF 54 PIECES PER HOUR

Four sets of broaches and a four-station indexing fixture, both designed and manufactured by Continental, work together to broach crankshaft forgings at a rate of 54 pieces per hour. Eight broaching passes are taken on the small steel forgings to cut to a total depth of 2 5/16 inches.

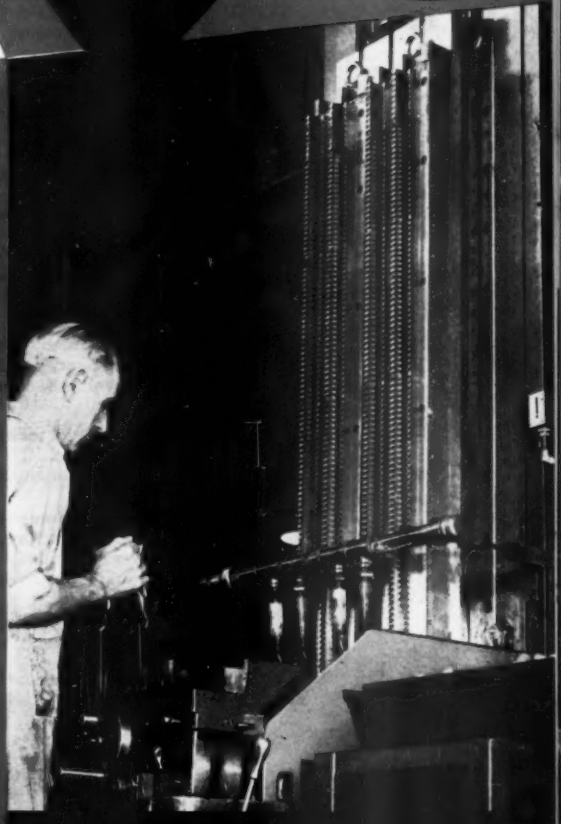
Each set of broaches cuts one deep slot and both outer sides of the counterbalancing members of the crankshaft. Cam locks operated by individual hand levers hold the parts in the fixture. The fixture is designed so that it must be fully retracted to the start position before the parts can be removed; thus new parts cannot be loaded until the fixture is in position for the first cut.

This is a typical example of how broaches and fixtures by Continental can add new efficiency to your operations. For full information contact your local representative, or write Continental in Detroit.

CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

DETROIT 32, MICHIGAN



Above: Vertical surface broaching machine with four sets of broaches and a four-station indexing fixture. Eight broaching passes are required to cut to a total depth of 2 5/16 inches. Fixture is indexed after each pass by means of a hand wheel.

Washington

Switched signals on CMP brought about the July 1 crackdown on metals for consumer durables. It had to come sooner or later, but everyone—including some controllers—guessed later.

Mobilization director Wilson made the decision. It ended long feud between NPA and policy makers at Defense Production Administration.

• • •

DPA was set for a "soft" CMP to start. Plan was to "program" most of DO-rated orders manufacturers were working on July 1, give them real allocations in October-December quarter. It was idea of former DPA boss Harrison.

But NPA chief Fleischmann balked. He told Wilson DO's were breaking down, that only CMP or an equivalent system would get metal for guns, ships, planes in third quarter.

• • •

Wilson agreed with Fleischmann—just in time. They warned the steelmakers Washington would take first whack at their third-quarter deliveries. The warning barely gave steel producers time to switch schedules on alloys.

• • •

But DPA was caught completely off base by Wilson's order. It wasn't staffed to fix industry-by-industry allocations of metal. More important, it was unwilling. "Frankly, we are scared to death of this thing," DPA boss Gibson said.

So DPA passed the buck to NPA. Gibson's agency simply recommended tentative goals for three categories of production: "Essential," including military and DO-rated programs like freight cars, electric power, machine tools; "intermediate," which is most other industrial equipment and construction; consumer durables.

NPA had to say how much metal for each class, which should get allocations. Even though that job was given to DPA by Wilson.

• • •

Behind DPA's softness on CMP is pressure from consumer durables makers. They flooded DPA and Congressmen with protests against CMP.

Big worry of consumer durables people is chunk of metal CMP will take from them. NPA's previous metal cutbacks have been bypassed by many consumers with good contacts among suppliers.

• • •

CMP will help metals fabricators on defense work. That includes makers of virtually all types of industrial equipment, as well as machine tools. They'll get allocations.

Allocations will cut across normal supply lines. Metal suppliers will have to honor them, even when it means shutting off an auto maker or any other producer of consumer durables.

• • •

Fleischmann will have more say on controls. He came out of the CMP row as Wilson's strongest lieutenant. Latest rumor: He's slated for Harrison's old job as head of DPA.

• • •

Volume of government pool orders will jump soon. Government lawyers questioned legality of pools until recently. So only orders put through were for clear emergency items, like tools for aircraft makers.

Government plans pools for cutting tools, gages, for broad list of users, now that lawyers are squared away. They'll quickly double the total $100 million put into pools up to April 1.

• • •

How small business can live with mobilization is subject of new DPA guide. It gives advice on how to get defense contracts and other government work, and what to do about controls. Get "Mobilization Guide" from Office of Small Business, Defense Production Administration, Washington 25, D. C.

• • •

Shortage of apprentices endangers mobilization, labor department warns. Industry is training about 300,000 apprentices, but deaths, resignations, disabilities cost more skilled workmen than apprentices replace annually.

A strike against one is not a strike against all—not even when you bargain through an association. NLRB says it's an unfair practice for association members to shut down when union strikes against only one member. Ruling affects shops which bargain through area associations.

• • •

Supreme Court decision that AFL and CIO officers must sign non-Communist affidavits is academic right now, since all have done so. Case to watch is West Texas Utilities. There lower court held: union's non-compliance does not relieve employer of duty to bargain; it only denies NLRB right to issue unfair practice charge.

• • •

Federal government will think twice before seizing plants to enforce wage increases resisted by employers. Supreme Court, in the Pewee Coal Case, found the government liable for operating losses which resulted.

MURCHEY REPRESENTATIVES

ATLANTA
C. W. Moore
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General Machinery Corp.
BUFFALO
Erwin Slate (Gasport)
CHICAGO
R. E. Ellis Engineering Co.
CLEVELAND
Production Tool Co.
DALLAS
Engineering Sales Co.
DAVENPORT
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DAYTON
Woodall Engineering & Sales Co.
DENVER
Iver J. Esbenson
DETROIT
Murchey Division
The Sheffield Corp.
ERIE
Walter J. Greenleaf
HARTFORD
W. H. Gourlie Co.
HOUSTON
Engineering Sales Co.
KANSAS CITY
Glade Ives
LANSING, MICHIGAN
A. D. Schneider & Co.
LOS ANGELES
Offield Industrial Sales & Engr. Co. (Compton)
MEMPHIS
Watt Machinery Co.
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John L. McCoy
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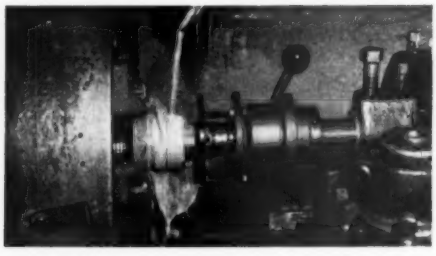

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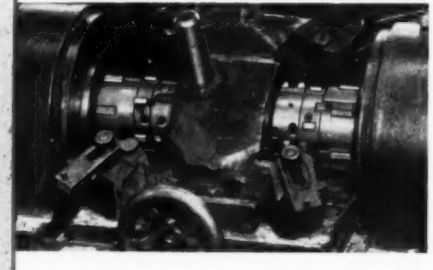

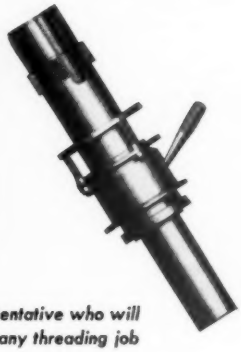

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Detroit

Automotive tooling continues to come out — both machine tools and jigs and fixtures. The quantity is diminishing, but the placements are still being made.

Some of it has the look of being for models beyond 1952. One canny factor in the business said: "Remember the Studebaker postwar model which was said to have been tooled in Mexico? I don't think anybody could tool an automobile in Mexico, but anyway it was tooled. Where I don't know. It looks as though automobile companies are not going to be left without a new model, come what may. That's the way I look at all this tooling being released lately."

Behind the releases are engineering departments working full tilt. Engineering purchasing in one big establishment, incidentally, is working ten hours a day and eight hours on Saturday. Most of that, of course, is on military releases.

• • •

Military tooling for automobile company programs, meanwhile, is on the upgrade, but is far away from peak as yet.

Meanwhile the big Detroit shops are pretty well jammed. Some officials are running away and hiding whenever they see someone approach who looks like a buyer. Smaller shop situations are not quite that good, however.

• • •

General Motors is rapidly increasing its defense manufacturing program. During the first quarter its government sales approximated $100,000,000, though most of its defense assignments are still in make-ready.

• • •

GM will probably begin tooling shortly for a new Hydra-Matic transmission, due to go into 1952 model automobiles. Actually comparatively little tooling is required—largely rearrangement of present valving in the transmission.

The result is a unit usable with more power for city driving and more economy for country cruising. At the same time, acceleration characteristics in second gear in the 15-20 mile an hour range are improved.

• • •

Back to armament: Burroughs Adding Machine Co. is expanding, primarily for arms output. About $2,000,000 has been earmarked for machine tools, going into additional manufacturing facilities to be built near the present plant at Plymouth, Mich., and in leased space near downtown Detroit.

• • •

Willys-Overland will order $3 million in make-ready for landing gear for Fairchild cargo planes. Wilson Foundry, Pontiac (a Willys subsidiary) will place $2 million for tools for shell cases.

Ford of Canada may manufacture jeeps at Windsor. The Canadian government is studying the project; Ford and Willys-Overland are surveying facilities. Any production in the Dominion would be for the use of the Canadian military forces.

• • •

Automobile sales are still high. The inside word is that they will continue very good. Key retail outlets, reporting to key factories, expect that business will absorb output for the rest of the summer.

The one sticky problem: Recent-model used cars. The year-by-year traders who get a new model each spring are finding the allowances very feeble indeed, compared with past expectancies. So some of them aren't trading. This isn't new, though; it happened last year and in 1949.

Why the soft prices on recent model trade-ins? The secondhand buyers aren't nibbling at the hitherto inflated price levels. Normalcy—more or less—is back.

Want to do well on your used car? See that it's an immediate prewar job (1940 or 1941), or else a recent model hardtop. They're head-and-shoulders above the rest of the market.

• • •

Biggest secret in the automobile business today is the shape of the combustion chamber in the new GM experimental engine officially designed for 100-and-a-little-plus octane gas, actually runnable on 97-octane.

The chamber shape may do a little something to those curleycue residues after burning—those microscopic strands which hang out from the sides of the cylinder wall and become incandescent during the firing cycle. Their incandescence helps create detonation—a basic engine program. Eliminate them and you can burn gasoline several octane numbers lower with good results.

Maybe GM succeeded in doing that—to a degree, anyway.

• • •

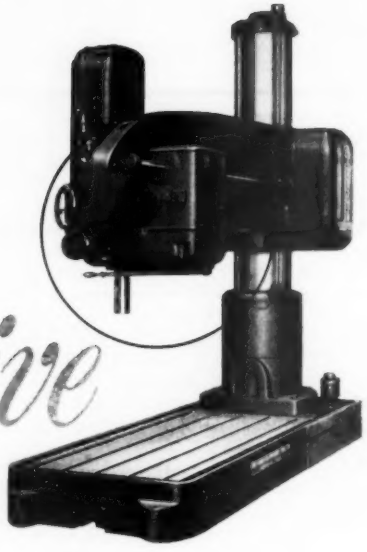
How long before that new high compression engine (29 miles per gallon, too) gets into production cars? Here's word from the petroleum people: Had Korea not intervened, today's 92 octane (here and there in premium pumps; not everywhere) would have gone up about three points in five years. At 95 octane, however, there would have been a plateau—no further advance for a while.

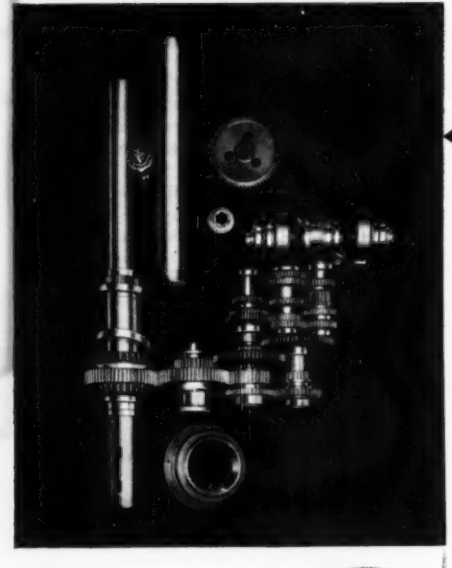
Automobile people agree with the move to 95 level, but they figure it at about one number per year. Three years, in other words. Allow another three, they concede, to bridge the new area above 95—and by then the GM engine might run satisfactorily on 96-97.

comparison proves Carlton's

low hung drive

is without comparison





the main drive gear in all Carlton Radial Drills is placed in the *lowest part of the head.*

It drives on the *largest diameter* of the spindle, *closest to the cutting tool* . . . a principle well established by its wide use in planers, lathes and milling machines.

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Thanks to the Low Hung Drive, Carlton can use an extra large spindle. And since the drive is always applied on the largest diameter of the spindle, it minimizes spindle twist . . . permits the use of higher speeds and greater feeds.

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Machine Tools

The defense tooling program is behind schedule. It should be at least 4-5 months further along. It is doubtful whether any of this time lag can be made up.

This serious fact is beginning to penetrate the minds of top defense planners in Washington. They are suddenly realizing what machine tools mean to the defense program.

They also are confronted by the knowledge that not much more than one-third of the machines needed for defense tooling have been placed. That is a very conservative guess.

• • •

Some fantastic figures of machine tool requirements have been bandied about Washington. The story which is heard the most puts the total at 270,000 units.

To whittle the figure down to realistic size, suppose 200,000 is taken as the required total. That probably is on the low side.

Amount of defense business allocated to machine tool builders to date is not over 70,000 units. So a deluge of orders is yet to come.

• • •

Why isn't machine tool production going up faster? Two factors are at the heart of the matter: Added manpower is almost impossible to get. Beyond that, the price impasse is to blame.

Machine tool builders will not go "all out" in subcontracting until they are assured that the extra costs will be covered by price regulations. Up to now, OPS officials have appeared more concerned about keeping costs down than in getting the extra machine tool production which is so badly needed.

• • •

Special price treatment for the machine tool industry, which is likely to take the form of an amendment to CPR-30 (Machinery Order), hinges on whether OPS accepts the theory that the machine tool industry was a "depressed industry" after the war, and up to Korea. U. S. Treasury already has accepted that premise.

OPS's decision is influenced by survey of 29 representative builders, whose balance sheets have been made available for the purpose.

The machine tool price muddle was the subject of an all-day discussion on May 16 by the Industry Advisory Committee and OPS people. An industry task force was back in Washington to meet with OPS on May 24 to try to work out a solution.

Most dramatic moment of the meeting on May 16 was the appearance late in the day of H. K. (Tony) Clarke, deputy chairman Munitions Board, who demanded a quick decision on machine tool prices to get production off dead center.

• • •

Importance of machine tools to armament production was driven home to Defense Mobilizer C. E. Wilson during his recent flying visit to London. It was reemphasized two weeks ago by the British on their visit to Washington.

S. W. Rawson, controller general of machine tools, and James Blackshaw, assistant secretary Ministry of Supply, comprised the British delegation. They were accompanied by A. J. M. Baker of the U. S. Economic Mission in London.

British requirements for U. S. machine tools are on a sounder basis as a result of these Washington talks. There will be a reduction in orders for heavy turret lathes. The production problem will be partially solved with semi-automatic lathes, including one of a new design, which can be produced much faster than the heavier, bigger machines.

• • •

British have on order in this country 7150 machine tools. Close analysis reveals, however, that hundreds of these units are not really machine tools. The actual number of machine tools is 6450, which will be increased shortly by 300. These machines represent a total outlay of $137 million.

It is likely that some of these machines will be cancelled because of: (1) extended deliveries, and (2) new requirements which will make necessary the placing of new orders. Some machines on order for reciprocating-type aircraft engines will be replaced by other machines for jet engine output.

• • •

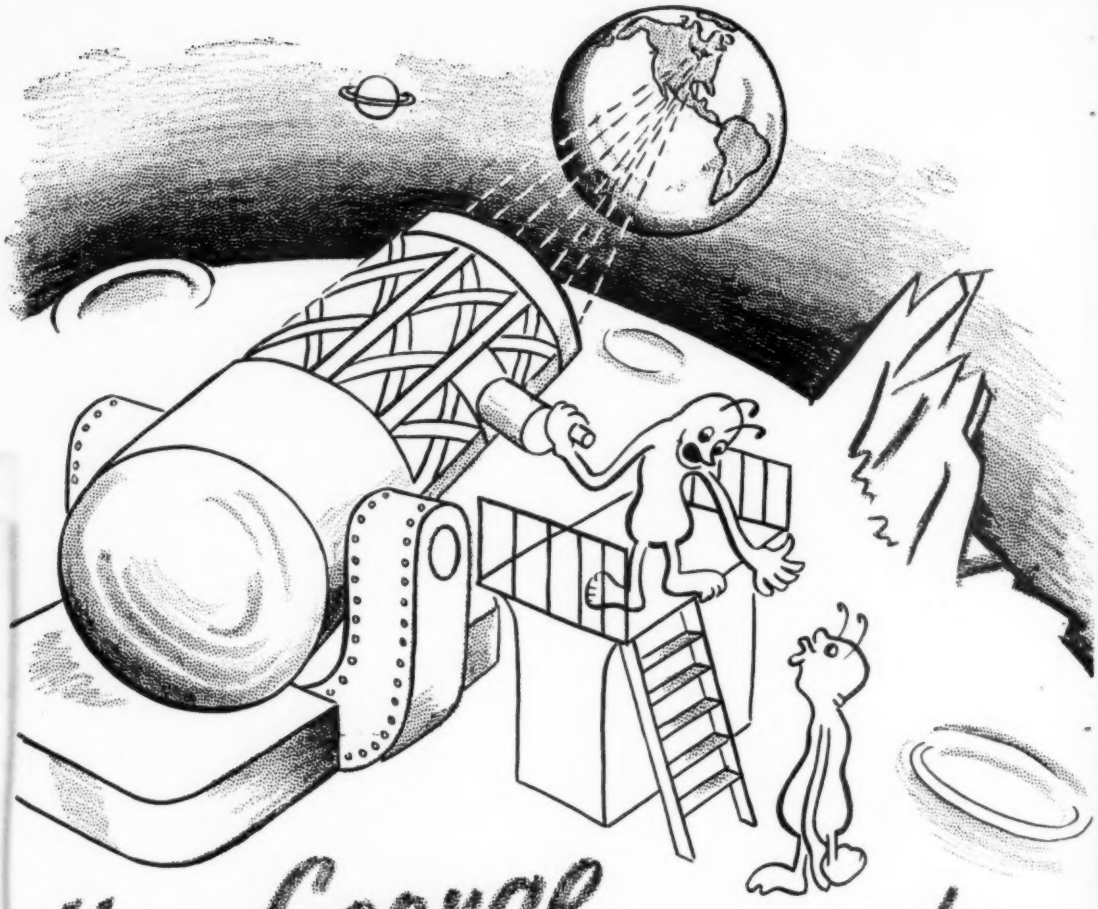
U. S. builders have been asked by British to name delivery dates on British orders carrying DO's and coming out of the 30% priority classification.

If British cannot get critical machines on time out of the 30% category, they have been assured by Washington that the requisite number will be taken from the 70% reserved for U. S. armed services.

• • •

Latest word from Washington is that OPS is not likely to take any immediate action on special relief for machine tool builders. A special order is "weeks away," unless the price controllers suddenly change about. They want to wait to see what the effect of CPR-30 will be.

Knut Engelsted, president, C. S. Walker Co., and **George Merryweather,** secretary, Motch & Merryweather Machinery Co., are now heading the Machine Tool Section of OPS in Washington.



Hey, George, look what they're

Type of part	7-pitch, 33-tooth, ⅞" face width gear	5½" internal gear	7" P.D., 6-pitch gears	¾" OD straight spline shaft	
Production time	One Shear-Speed in 6½ hours handles production of 14 other machines in 8 hrs. ea.	30 seconds each	49 seconds each	24 seconds each	

**The Shear-Speed is also a highly versatile machine. Some producers use a single machine to produce, in turn, runs of a number of different gears.*

That's what the Michigan Shear-Speed gear shaper does. It accurately produces toothed parts in a fraction of the time required by other methods—by cutting ALL the teeth at the same time.

Gears, with or without shoulders, toothed clutches with or without interrupted teeth, straight splines, involute splines, sprockets, special toothed parts like eccentric cams or brake ratchets—all can be cut faster and at lower cost on the Michigan Shear-Speed.*

In the table below are a few typical examples. But—better than that—let us figure what kind of production you can get on YOUR gears.

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from blank to finished gear

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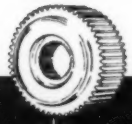
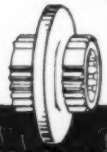
doing now!

...they're cutting ALL the teeth *at the same time.*

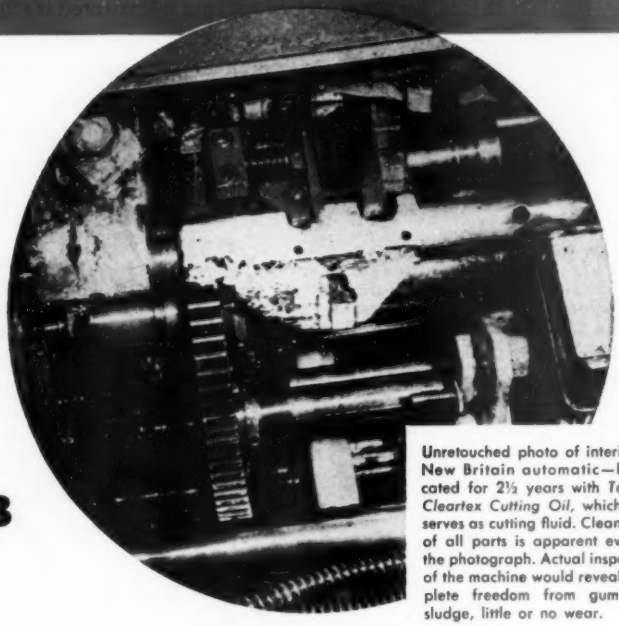




	1¾" face, 51-tooth gear	12 & 14 pitch interrupted tooth clutches	Eccentric (free-wheeling cam) cut to shoulder	6-pitch oil pump gear	5-pitch, 15-tooth Brake Ratchets
	38 seconds each	16 seconds each	14 seconds each	69 seconds each	110 seconds per set of 4

THIS DUAL PURPOSE OIL STEPS UP PRODUCTION

New England manufacturer* also gets longer tool life, cleaner operation with TEXACO CLEARTEX CUTTING OIL B



Unretouched photo of interior of New Britain automatic—lubricated for 2½ years with *Texaco Cleartex Cutting Oil*, which also serves as cutting fluid. Cleanliness of all parts is apparent even in the photograph. Actual inspection of the machine would reveal complete freedom from gum and sludge, little or no wear.

For 2½ years this plant has been using one oil—*Texaco Cleartex Cutting Oil B*—as both cutting fluid and machine lubricant in their New Britain automatics. Results are notably better than those obtained when separate cutting and lube oils were used. Production is up; costs are down.

Machines are in regular production, 16 hours a day, on No. 430 stainless steel. Setup includes drilling, forming and cut-off operations. With *Texaco Cleartex Cutting Oil B*, drill life has been stepped up to one million pieces, and a circular form tool is good for two million pieces.

Another impressive fact is the exceptional cleanliness of the interior of the lubricating side after 2½ years' use (see illustration) . . . and, of course, there has been no wastage due to contamination of the coolant by the lube oil—as when two oils were used.

Whatever your metal cutting operations, there are Texaco Cutting, Grinding and Soluble Oils to help you do them better, faster, and at lower cost. A Texaco Lubrication Engineer will gladly work with you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

**Name of this Texaco user on request*

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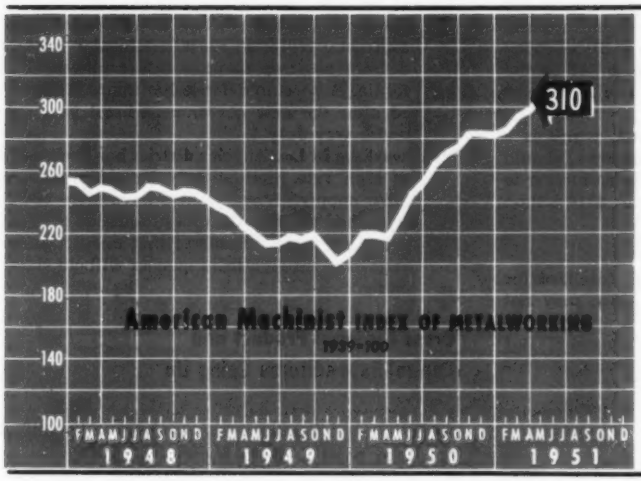
Gaging Metalworking


340
300
260
220
180
140
100
310
American Machinist INDEX OF METALWORKING
1939=100
F M A M J J A S O N D F M A M J J A S O N D F M A M J J A S O N D F M A M J J A S O N D
1948
1949
1950
1951

INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAY '51	APR. '51(p)	MAR. '51(r)	MAY '50
	310*	**305**	**303**	**248**
Machinery	300	295	295	230
Electrical Manufacturing	356	341	341	292
Automobiles, Trucks	240	255	255	241
Transportation Equipment	354	350	350	221
Other Metalworking	319	314	314	261

* Estimated (p) Preliminary (r) Revised

Metalworking Production Continues Climb

Metalworking production continues to climb steadily. It has risen every month this year.

AMERICAN MACHINIST'S index, based on manhours worked, is estimated at 310 in May. That puts it 5 points higher than during April.

The index was 293 in January, and 287 in December. The amazing thing that has happened to metalworking is shown by comparing the index now with April of 1950. Then it was 231, exactly 79 points under today.

• • •

In only one component of the index, automobiles, was the trend downward in April. That trend probably continued this month.

Biggest gain over a year ago has been in the component representing transportation other than motor cars—railroad equipment and aircraft. In April, 1950, it stood at 212. The same month of this year it had jumped to 354.

• • •

Metalworking operations won't be cramped much in June. But managements are worrying about the third quarter and what CMP will do to them. Those who must get steel outside the CMP sphere are bothered the most.

Despite dislocations caused by Washington restrictions, metalworking promises to go through the third quarter with no slackening.

• • •

Defense orders are filling up cutbacks from automotive and other civilian users for most screw machine product companies.

One typical manufacturer reports 50% of third quarter bookings carry DO's. Another firm puts its DO's at 60%, with rise to 85% expected by next fall.

• • •

Farm implement industry plans to continue production at high rate through June and third quarter. Preferred position under DO-87 is expected to get enough steel.

• • •

Pressed metal fabricators are skeptical about future business. Orders from the automotive trade have tapered all year, with a sharp drop anticipated July 1. Meanwhile defense work takes up only 10% of capacity, and civilian-product orders are being cancelled.

Outlook for subcontracting work is bleak. Why? Large customers are putting in their own press equipment. To add to their woes, fabricators report that steel mills have not kept their promises on allocations, and warehouses cannot make up the differences.

• • •

Getting pig iron is the bane of gray iron founders these days. They have gone to Washington to try to have their share pegged higher. Suggested formula for a "fair distribution" of pig —400 lb of castings per ton of other steel used in making a product.

Gaging Business

Industrial production is likely to rise notably in the last half of '51. Government economists guess that the Federal Reserve Index will be above 230 by October and may get up to 245 by the year-end or soon there after. The index was 222 in April.

That's not all. Gross national product, which is a good barometer of the entire economy, should be at $325 billion in October and rise further to $340 billion by January. It was at $314 billion in the first quarter.

• • •

Prices and wages will be fairly well stabilized for a while. Wholesale prices, at 183.5, may not go up until fall. Consumer prices will increase only 2% or a little more this summer. But they will resume their faster upswing as winter approaches.

Weekly wages in factories will be up to $68 or more by October. They now are near $65.

• • •

Important freight car builder hopes to make 3000 cars this month, as against 2660 in April. Last month's total for commercial shops and captive (railroad) shops was a little over 8000 units. Production goal is 10,000 a month.

Freight car people are worried about projected cut, probably 25%, in their third quarter steel deliveries. Locomotive builders, running three shifts or two long shifts, will be hit worse than freight car makers.

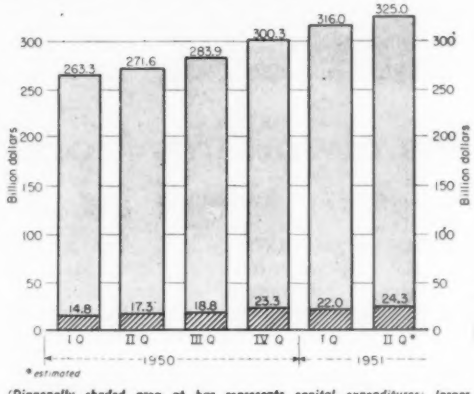
• • •

Large metalworking shops in San Francisco area are working at full capacity, but many small shops have had to cut back to 50% because of lack of defense work.

Biggest boom in Los Angeles area is in plants doing electronic defense work. This, plus some AEC contracts, comprise most spectacular part of defense program to filter into southern California. A boost in defense operations is expected after the new government fiscal year gets under way July 1.

Metalworking in Los Angeles district has been going at high rate, limited only by materials and labor supply. Stove makers have more orders than they can fill. Oil tool production is at top level; plants anticipate getting enough materials to go through third quarter without slackening.

Gross National Product and Capital Expenditures Going Up



(Diagonally shaded area at bar represents capital expenditures; larger area is gross national product.)

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	229.8	230.2	189.4
Steel ingot operations (thousands of tons)	2,077	2,073	1,908
Electric power output (million kilowatt hours)	6,567	6,560	5,864
Production of automobiles and trucks	158,411	154,523	174,480
Engineering construction awards. (Eng. News-Record—millions)	$151.8	$294.8	$206.0

QUARTERLY BUSINESS INDICATORS

	Latest Quarter	Preceding Quarter	Year Ago
Gross National Product (billions)**	$316.0	$300.3	$263.3
Expenditures on new plant and equipment (millions)	$6,080	$5,500	$4,330
Profits after taxes in primary iron and steel industry (millions)	$257	$270	$107
Profits after taxes in machinery industry (millions)	$288	$271	$163
Profits after taxes electrical machinery industry (millions)	$215	$180	$147
Profits after taxes in motor vehicles and parts industry (millions)	$255	$448	$269
Motors and generators new orders index (1936 = 100)	809**	674	339

* Seasonally adjusted. ** Estimated.

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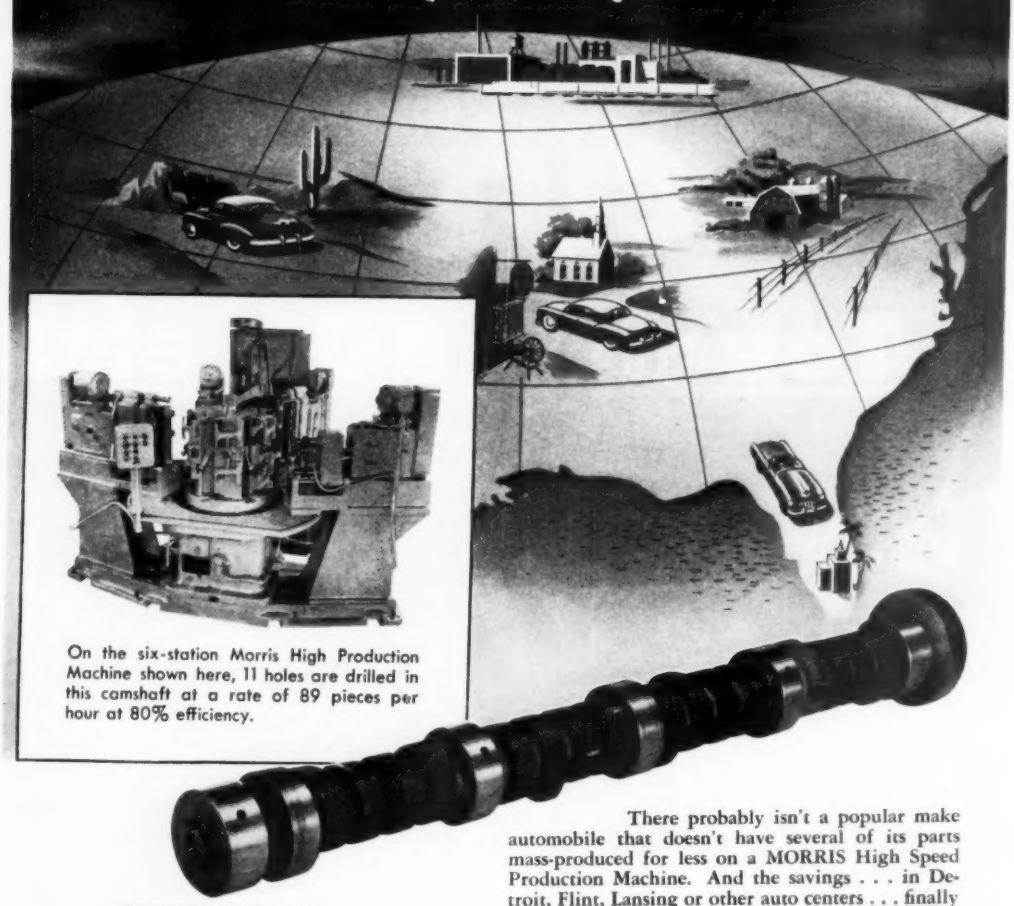

On the six-station Morris High Production Machine shown here, 11 holes are drilled in this camshaft at a rate of 89 pieces per hour at 80% efficiency.

OPERATIONAL SEQUENCE

Station 1—Load and unload
2—Drill two 3/16" holes part way
Drill one 3/16" hole to depth
3—Drill two 3/16" holes through
4—Drill one 1/4" hole through
5—Drill two 3/16" holes part way
Drill one 3/16" hole to depth
6—Drill two 3/16" holes through

TOTAL . . . 11 operations

There probably isn't a popular make automobile that doesn't have several of its parts mass-produced for less on a MORRIS High Speed Production Machine. And the savings . . . in Detroit, Flint, Lansing or other auto centers . . . finally show up where they count most, in the delivered price of your car in ANYTOWN, U.S.A.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Don't Put Replacement To One Side

The long-term manpower situation is not pleasant to think about. In fact, it promises to be bad.

Statistics show that for the next five to ten years not enough young men will be coming into the working force and into the armed services to satisfy the nation's needs comfortably.

Too many men will be reaching the age of sixty, and too few the age of eighteen. The depression years of the 1930's are mainly responsible for this undesirable outlook.

Manpower, in Metalworking as elsewhere, will be at a premium. It will attain this status for two reasons: first, it will be hard to get. But beyond that, it will be expensive. In fact, it already is close to a luxury.

IF YOU DOUBT that statement, look at this indisputable piece of evidence: The United Automobile Workers (CIO) says that its members, on the average, have won advances in pay of eighty cents an hour since the end of World War II.

Sixty of the eighty cents consists of direct hourly wage increases that went into the pay envelope. The other twenty cents are so-called fringe benefits—pensions, insurance, vacations.

Mind you, the eighty cents is on top of the all-time-high wages paid at the close of the war. And the end is not in sight. Now the talk is that wage ceilings imposed by Washington will be pierced badly this summer.

It is obvious, then, that manpower will be more of a problem than ever. If metalworking management is wise, it will take steps immediately — if it has not already acted — to help solve this problem.

THIS MUCH APPEARS plain under the circumstances: Every production operation that can be done better and faster and cheaper by machine than by manpower should be mechanized.

Beyond that, every production operation that can be done better and faster and cheaper on a new machine than on an old machine should be put on a new machine. It is wasteful to do otherwise.

What we are trying to say is that for manpower reasons alone, if for no other, you should find out what new and better machines can do for you. You should plan modernization and replacement to lower your labor costs.

You may say: "What's the use of talking seriously about this matter now? We can't get new machines if we want them because of long deliveries stemming from the defense program."

THE ANSWER IS: "Don't wait until after the defense program is over to make your plans. Be ready to act quickly when we are over the defense hump. That may be sooner than you think."

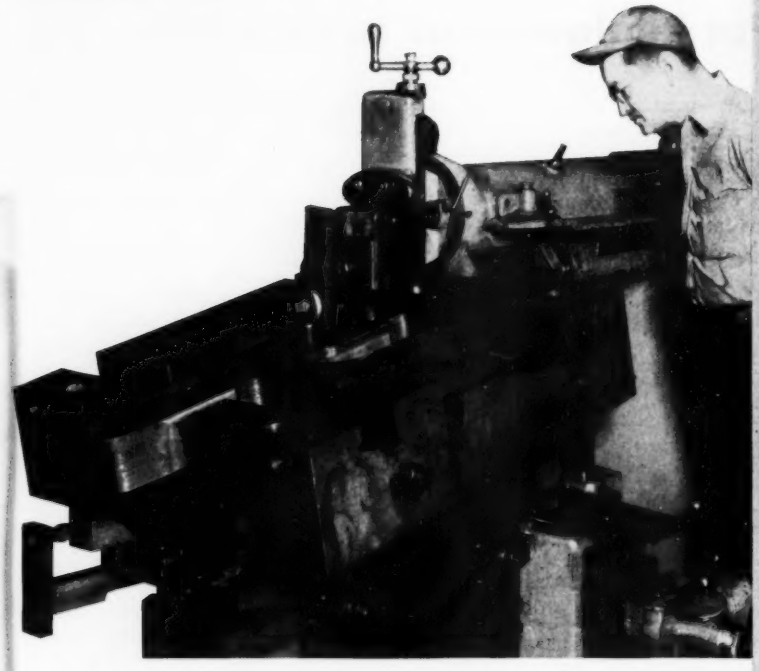
Metalworking companies with a regular, steady replacement program have found that it pays off handsomely. It is an intelligent and profitable way to ease your manpower problems and to lower your costs.

Don't put replacement to one side because you can't do much about it right now. Remember that today is the time to plan for tomorrow.

Burnham Finney

Cincinnati Shapers are

versatile money savers...



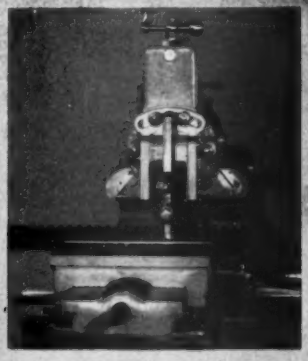
Eight to ten hours' work cut to fifteen minutes in this unusual application of a versatile Cincinnati Shaper.

Hand scraping the mating surfaces of press bed bolsters required eight to ten hours. On this Cincinnati Shaper the lapping operation replacing the hand scraping method takes only fifteen minutes.

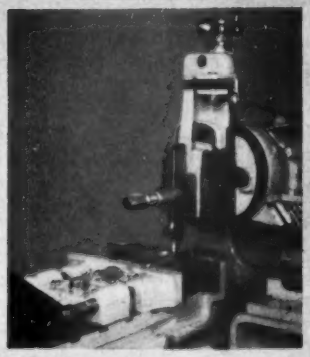
Versatile Cincinnati Shapers, with low tooling and set-up costs, bring to your shop a money-saving "handy man."

Write for Catalog N-5, illustrating the complete line of powerful, accurate and versatile Cincinnati Shapers. You will find just the size and type for your shop.

1. Internal Shaping
Many irregular shapes are cut with a simple extension tool.



2. Maintenance and Repair
The unusual versatility of a shaper is invaluable for this work.



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A great variety of shapes are automatically machined with tracer control.

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SHAPERS · SHEARS · BRAKES

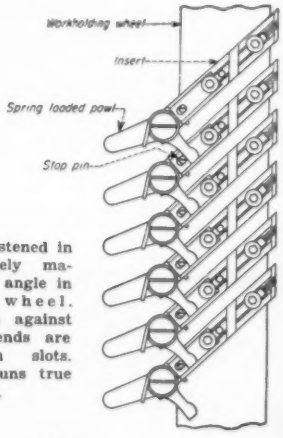
Grinding and heat-treating machine works on wire only 0.008 in. in diameter. Wire ends of contact brushes are ground to dimension and hardened in continuous cycle. Operator sits at machine and positions brushes in workholding wheel

HOW TO ASSEMBLE AND GRIND FINE WIRE BRUSHES

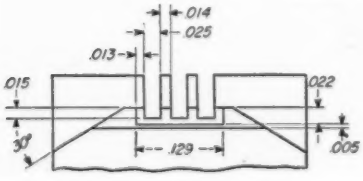
Cost is low and quality high in mechanical assembly of 0.008-in. wire in the fixed patterns required for contact brushes. Wire ends then are ground and heat-treated in a continuous cycle

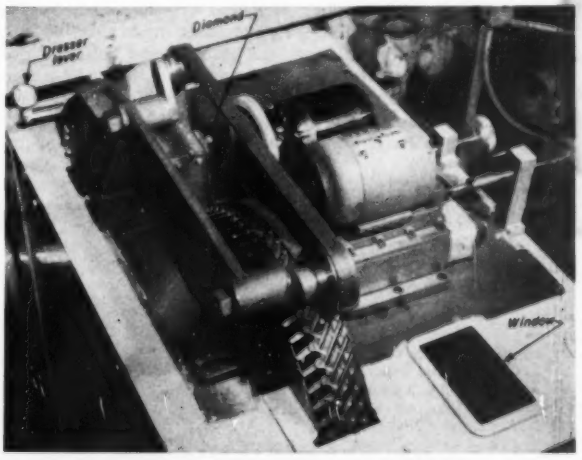
BY MILES J. ROWAN, ASSOCIATE EDITOR

ASSEMBLY and machining operations on wire as small as 0.008-in. diameter are performed regularly at IBM's Endicott plant. Wire of this size is required in many of the contact brushes produced by IBM for tabulating, accounting, and other machines in the company's line. As anywhere from 8 to 80 brushes are required in each machine, total production runs to several millions yearly. Yet, brushes differ considerably and some are required only in

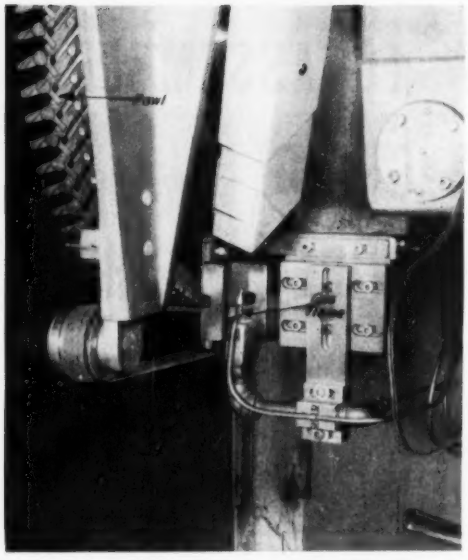


Inserts are fastened in slots accurately machined at 42° angle in workholding wheel. Brush locates against pawl; wire ends are supported in slots. Wheel face runs true within 0.001 in.

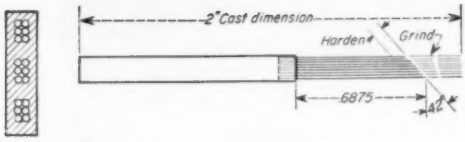




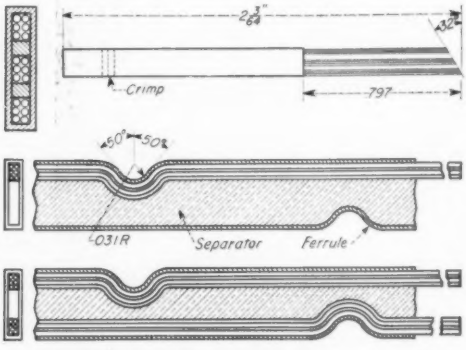
Workholding wheel rotates continuously to move brushes past grinding wheels. Rubber belt holds brushes in inserts in wheel, encircling about 270° of wheel surface. Window permits view of heat-treating flame at bottom of drum



Heat-treating unit is attached to adjustable mounting bracket. Spring-loaded pawl on workholding wheel is actuated by cam on machine frame to advance brush in holder so correct length of wire will project into heat-treating flame



Die-cast brush has three groups of 0.008 in. music wire, six wires to a group



Assembled brush consists of 0.008-in. music wire and separator in fixed pattern within brass ferrule. Other assemblies shown also can be produced by changing guides in fixture. All crimping is to dimensions and tolerances shown on the one brush assembly

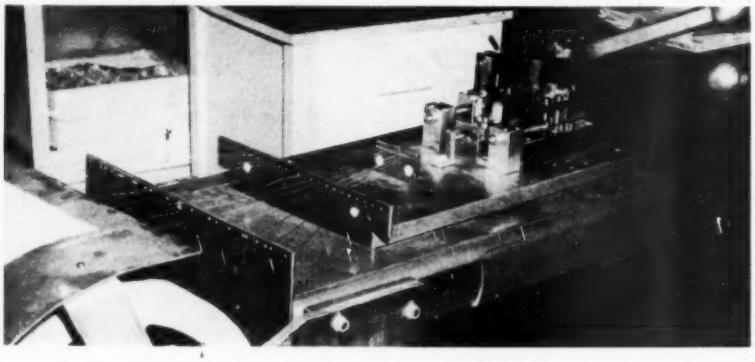
low volume. Thus, equipment for brush production ranges from highly mechanized setups to predominately hand-operated fixtures.

One of the most efficient setups is that developed for grinding and heat-treating die-cast brushes. These are received from a supplier with the wire properly located in the die-cast material. However, wire ends must be ground to length and hardened to provide long, trouble-free operation in service. This is done in a special machine designed and built at IBM. The operation is continuous with the operator simply loading brushes into a workholding wheel. No clamping is required and unloading is automatic. With this machine, brushes are ground and hardened automatically at the same time at a rate of approximately 800 per hour.

Grinding and Heat-Treating

The workholding wheel is mounted on a horizontal axis and is driven through a gearbox at one revolution every three minutes. Rotation of the wheel carries the brushes past a rough and a finish grinding wheel, each with individual motor drive. Continuing around the wheel, brush ends pass through a gas flame and are air-cooled. Brushes are automatically ejected to a tote pan.

Although completely special, the machine is flexible in operation. Brushes are positioned in inserts



Brush assembly fixture takes wire and separator from reel and guides them into correct pattern. Ferrule is inserted at right and pivoted lever is moved left to slide ferrule over wire and separator. Assembly is crimped, drawn to right, and cut off

which support the wire ends against the pressure of the grinding wheel and which also provide location for the die-cast section of the brush. Inserts are removable and brushes of differing length can be processed simply by changing inserts. The angle of the wheel slot in which the insert rests fixes the angle on the end of the brush. Wheels with 32°, 42° and 45° slots have been made.

Accuracy in the grinding operation depends upon the accuracy of the wheel and inserts, and upon the type and condition of the grinding wheels. The OD of the workholding wheel is concentric with the hub bore within 0.001 in. Slots for the inserts are held to +0.001, −0.000. Finished brushes are checked on a comparator for length and angle.

The first grinding operation is performed with a 6-in. rubber-bonded cutoff wheel attached to a ¼-hp motor that runs under load at approximately 9000 rpm. The second operation finishes the brushes to size, removing approximately 0.003 in. A 200-grit cup wheel is employed. As the wheel assemblies are mounted on screw-actuated slides, they can be adjusted to provide the proper dimension during the operation. The finishing wheel is diamond dressed about every 1000 pieces. Dressing removes about 0.001 in. after which the wheel is reset to dimension. Grinding dust is exhausted from the machine.

Heat-treatment is with city gas, mixed and metered in a standard Selas Gas Combustion Controller Type J. The brush ends are in the flame approximately two seconds, then are air-cooled. A fixed ejector set in line with the transverse slot in the insert picks the brush from the insert. The belt, which holds the brushes in place until they are completed, is driven by frictional contact with the workholding wheel.

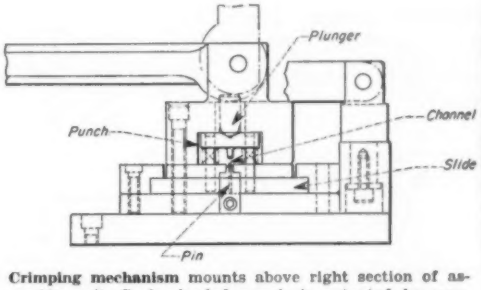
Brush Assembly Fixture

Assembled brushes consist of music-wire groups and one or more separators within a brass ferrule. In one method, assembly is performed in a hand-operated fixture that accomplishes the delicate positioning operation automatically. The operator needs only to insert the ferrule and move two levers. Threading, crimping, and cutoff are performed in the one setup without dependence on individual operator skill. Uniform quality is obtained at the rate of approximately 180 pieces/hr and rejects are negligible.

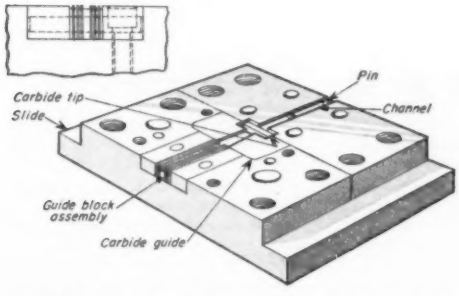
Both wire and separator pass from individual reels through guide bushings into the fixture proper. Here spacers align the wire and separator properly for insertion into the ferrule. The ferrule is placed in the fixture slide and is drawn back over the prepositioned separator and wire groups by moving the slide lever. In this position, one lever is depressed to crimp the entire assembly. The slide then is moved to its original position, drawing wire and separator into the correct position for assembly of the next ferrule. In the forward position, a second lever is depressed to cut off the assembled brush. A Carboloy blade acting against Carboloy inserts provides a cutoff that requires very little attention.

Brakes Control Movement

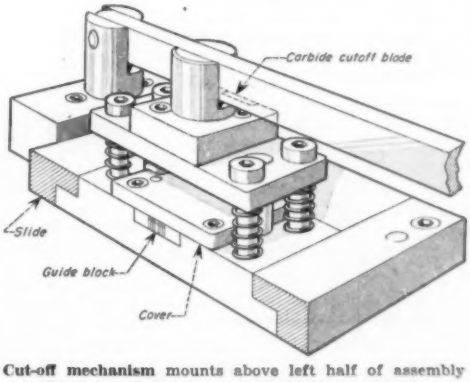
Brakes in the fixture can be adjusted to control the movements of the wires and the separator. One brake acts on the separator but permits the wires to clear. A second holds the wires but permits the separator to slide. In this way, the wires are held in the



Crimping mechanism mounts above right section of assembly unit. Spring-loaded punch is actuated by cam. Ferrule is inserted in channel ahead of pin



Assembly unit holds wire in slots 0.009 in. wide and formed by steel strips only 0.005 in. thick. Opening in carbide guide holds pattern to 0.114 in. Inside dimension of ferrule, which is inserted in channel, is 0.122 in.



Cut-off mechanism mounts above left half of assembly unit. Blade travels between carbide block in assembly unit and carbide tip on lower section of crimping punch

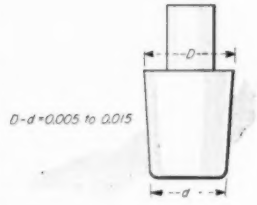
forward position as the ferrule is moved back over the group, but the separator is pushed back flush with the front end of the ferrule by means of a pin in the fixture slide. Tension is adjusted to prevent over-running and jamming in the positioning section of the fixture.

In this section, spacers are individual strips of 0.005-in.-thick steel, hardened and doweled in the block. Initially a block machined from the solid was tried but was not satisfactory. As all dimensions in this section of the fixture are held to close limits, cleanliness is essential. To remove all dust and lint, a vacuum system has been attached to the positioning section. Since its addition, no trouble has been experienced in threading the wire through the ferrule, despite the small diameter and the ever-present tendency to kink.

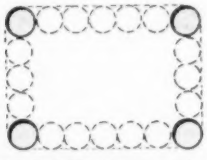
With these units, fine wire is processed consistently to close limits and to uniform high standards of quality. And in each case the job is done as economically as possible within the limits imposed by the type of tooling that the job quantities justify.

DIEMAKER'S KINKS

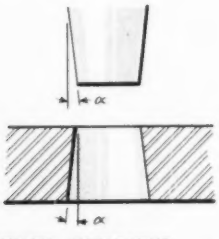
BY FEDERICO STRASSER



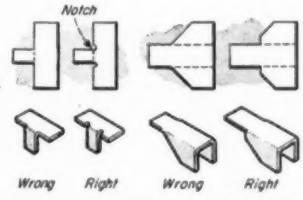
DRAWING PUNCHES should be slightly tapered in order to facilitate the ejection of drawn shells. A fraction of a degree per side may suffice.



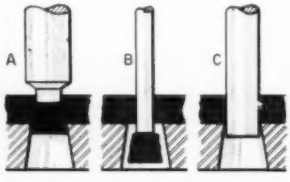
WHEN A RADIUS is required at the corner of a blanking opening, drill a suitable hole in the correct location, and ream or bore it to the exact size. Then proceed with the remaining holes.



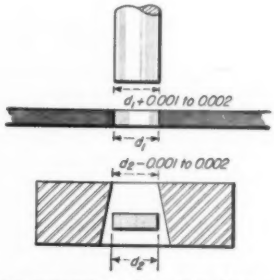
CONSTANT CLEARANCE can be maintained, despite repeated die grindings, if the punch is negatively tapered at the same angle as the clearance-hole angle in the die plate. Thus, as both members are ground the clearance remains the same, and trouble with excessive clearance does not arise. Cutting conditions are satisfactory with a "negative-rake" punch.



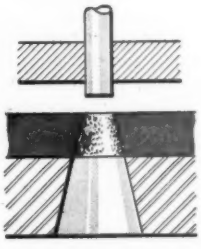
NOTCHING of blanks facilitates bending. Provision for notches should be made, even though they make the tools somewhat more complicated. Better results are obtained, too, if work contours adjacent to bends meet at 90°.



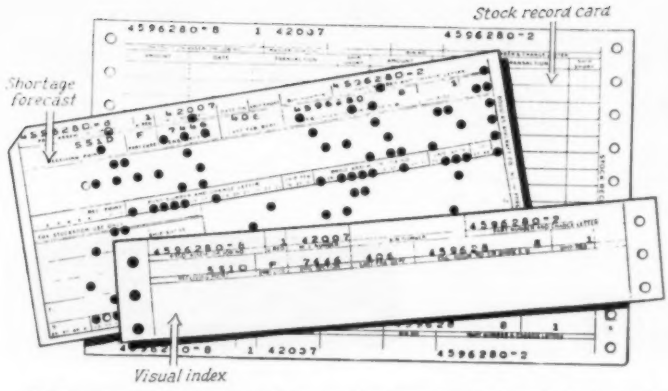
STEPPED PUNCHING may be necessary on difficult materials. Instead of piercing a hole entirely with one punch, use three. The first punch, as at *A* is made of high-quality material and penetrates a short distance to start fracture of the slug. Punch *B* pushes out the slug. Punch *C* shaves the hole to size and cylindrical form.



FOR PRECISION dies, take into account contraction of punched holes so that they are somewhat smaller than the punch, and of expansion of blanks so that they are a little larger than the die opening. The exact variation can be determined only by trial, but the sketch shows a practical approximation as a starting point.



HOLES AS SMALL as 50% of stock thickness can be pierced successfully by scrupulous observation of the following rules: (1) rigid support for the punch placed close to the stock and die, (2) more clearance than usual; up to double or more the standard amount, (3) excellent alignment and stripping conditions, (4) high-quality finish on punch and die, (5) tool steel of high compressive strength, and (6) a special form on the punch face.



Stockroom records are prepared by machine from punched cards that are the basic parts list. Stockroom personnel only enter bin number and activity

TABULATION MACHINES SIMPLIFY STOCKROOM CONTROL

BY JAMES JOSEPH

STOCKROOM CONTROL at Douglas Aircraft Co., Santa Monica, Calif., is geared to the business machine. High-speed sorters, tabulators, summarizers—once considered an Accounting Department tool—now keep stockrooms and production closely controlled. Much manual recording has been eliminated and estimates of long- and short-term shortages can be prepared readily.

At one time, every part and material order was written up manually, although many modern aircraft have as many as 150,000 parts. Writing up 150,000 separate orders took weeks—and was often complicated when ten instead of one plane were ordered. If that was the case, each parts order had to be manually extended (multiplied) by ten to give the required number for the full ten-plane order.

Production Control Plan

Then, three years ago, Douglas adapted the business machine to parts and materials requisitions. A Factory Tabulating Section was set up midway between Engineering and Manufacturing—which was both its physical and functional position in the organization.

Now, when a plan is approved, it is first manually dissected into its, say, 150,000 parts, along with materials necessary to manufacture and fabricate these parts. No machine has yet been invented which can scan a blueprint and automatically draw up a parts and materials list, so this is the one manual operation still remaining. From here the list goes to Factory Tabulating, where a key-punch operator makes up three cards for each part. One is a *material card*, from which actual materials needed to make the part are compiled. Another is a *file card*. And the third card, an *assembly parts list file card* is used to create stockroom paper, control debit and credit to stockroom inventories, and for *shortage forecasts* so Purchasing can set up inventories to meet current orders. It is this card that is the key to stockroom control.

It is obvious that we now have, say, 150,000 *assembly parts list file cards*—one for each part in the aircraft. These cards make up our *basic* parts list. If ten ships are ordered, these 150,000 cards can be run through tabulating, summarizing, extending machines, and automatically typed up. Ready for the stockroom is a complete parts list for ten ships. Once the basic parts cards for any model of aircraft have been key-punched, a parts list for ten ships—or for 100 ships—or for 1000 ships—can be automatically machine made-up in a day's time. This is a new departure in production and material control at Douglas and probably is as fast a system for re-stocking the stockroom and for supplying manufacturing and tooling sections with material as in use today.

Filling Actual Orders

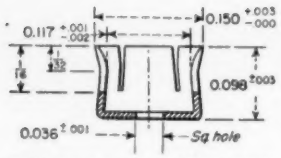
While the *material card* is used to advance order parts and materials for as many aircraft as Douglas believes will be ordered, actual orders trigger the *assembly parts list file card* into action.

From the *assembly parts list file cards* a *shortage forecast card* automatically is made up. This is a duplicate of the *assembly parts list file cards* extended to the amount of parts needed to fill the order for aircraft. Thus, if ten aircraft are ordered, the stockroom will need ten parts of a certain type—and these will be debited from stockroom supplies. The *shortage forecast card* goes to the stockroom.

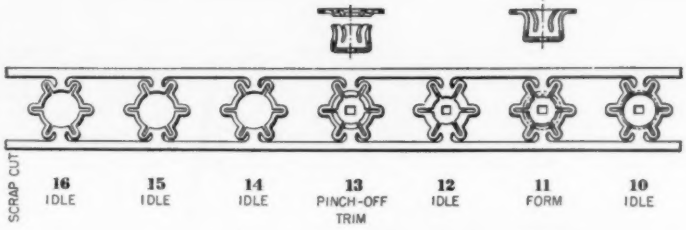
However, before it goes to the stockroom, business machines automatically reproduce a *stock record card* from the *forecast card* and these become the actual stockroom paper. To this *stock record card* is attached a "bin location" cross-reference visual index. Both cards (except for the bin number) are made up automatically by machine.

Where many another stockroom must spend much time manually preparing its records from manual parts lists, Douglas' stockroom need only note stock withdrawals and credits, and write in the bin numbers. This has taken hours out of stockroom procedure.

When shortages are forecast in the stockroom, the *shortage forecast cards* are sent to the Factory Tabulating Division where they are punched with the ship number that is short and are sorted and tabulated for expediting purposes.



Split cap is made of 0.010 × 7/16 in. brass strip (70-30 composition, ¼ hard). Frequent checks are made on the 0.017 in. dimension and 0.036 square hole. Operators are supplied with gages



PROGRESSIVE DIE DRAW-FOLDS A SPLIT CAP

Pretrimming the blank with developed notches allows room for the metal to flow so that six prongs are produced in the cup wall

BY RUPERT LE GRAND, Associate Editor

SEVEN identical progressive dies are required by John Volkert Metal Stampings, Inc., Queens Village, N. Y., in order to produce 1,500,000 split end caps in a 40-hr week. Two of these brass parts are required per ceramic condenser, an item used in great quantities by the electronic industry.

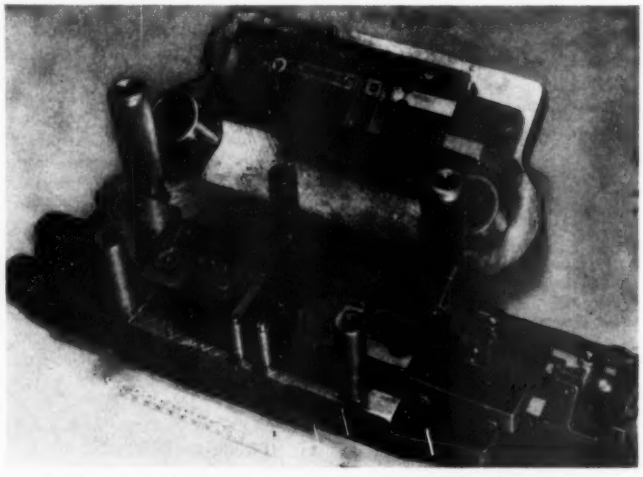
Five of the dies are always set up and running at 185 strokes per min., the other two are either being ground, repaired or held as spares. Two million pieces are produced per 0.005 in. die grind. About 3/16 in. can be removed.

Basic Problems—In designing and building dies for high-speed production of the split end cap, Volkert engineers faced a number of problems, including these: (1) producing a progressive die that avoids the slowness and troubles of an earlier tool that transferred a free cup, and also keeps slugs, etc., separated from finished work, (2) necking in the six prongs so that they act like a spring clip, and (3) development of a blank that can be folded up to produce the required part, plus means to carry it along until pinch trimmed.

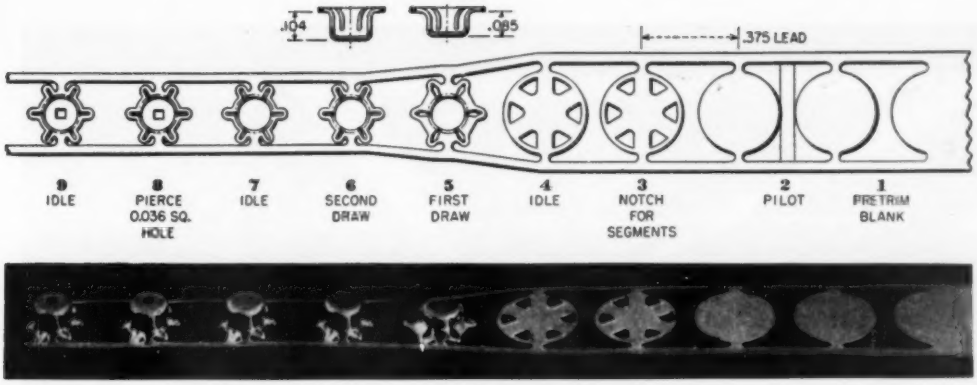
Scrap Strip Development—Because of the nature and small size of the split end cap, several problems had to be solved in the scrap strip development. First, the lead is only 0.375 in. Hence, idle stations must be provided, to give room for punch and die elements performing significant operations. Second, the scrap strip must not be distorted enough to change the lead. Third, the blank must be such that the part can be folded easily.

The second requirement was met by trimming the circular blank with an hourglass punch, so that two necks hold the blank to the scrap side members. The members can thus move inward as the blank is drawn, and the lead is maintained by a blade-like pilot.

So that the cup walls will fold up, leaving a narrow slot between prongs, pie-shaped notches are pierced in the circular blank. At the first draw, the notches start to close in and the adjacent metal at the periphery moves outward radially. The second draw completes



Matrix-type construction is employed in a 2-post dieset. Guide posts and bushings are lapped for a good slip fit. Steam cylinder (600 W) oil is used for guide-post lubrication



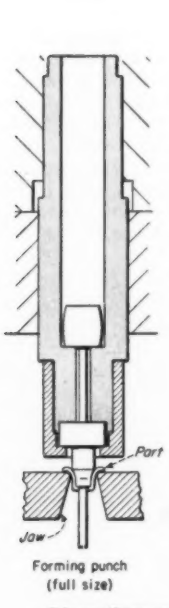
Idle stations are used freely in order to provide space for tooling details, at significant stations like piercing, drawing, forming and pinch trimming. Photograph of product development shows work upside down for clarity of detail

this process, the excess metal being thrown into the scrap ring.

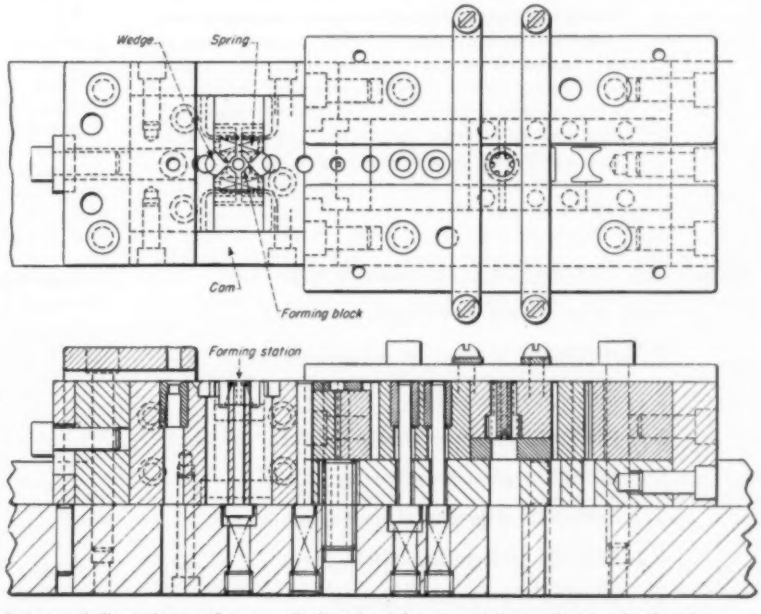
Forming Operation—By necking the cup to an ID of 0.117 in. at a distance 1/32 in. from the mouth, the prongs are caused to assume a bowed contact shape that grips the ceramic condenser. This operation is performed by using the punch as a mandrel, and supplying radially closing jaws in the die.

The punch that acts as a mandrel at the necking operation is made so that it can move 0.010 in. radially. The spring pin that runs through the punch has a barrel-shaped head, leaving the whole assembly free to center the cup in the forming jaws. Two adjustable striker pins in the punch holder act upon two cams in the die member. These cams force inward the jaws, which are constrained to move radially by two stationary wedges. Jaw faces and the mandrel are shaped so that the cup will be necked down to required contour.

Die Construction — The matrix system (*AM*—April 2, 1951) is used because of the smallness of the tools. Clearance in die openings is specified as 0.005 in. per side, or 0.001 in. total. However, the shop works to a total clearance of 0.0007 in., which produces more pieces per grind.



Forming punch
(full size)



Die sections are made to exact dimensions and are fitted into a hardened and ground channel called a matrix. This matrix in turn fits into channel in shoe.

Spring pin at forming station pushes cup in place in open forming jaws, and then formed section of punch enters cup, while jaws close to neck in the cup wall

Grid pattern of fluorescents in machine shop cuts shadows to a minimum and has pleasing appearance. Industrial reflectors with two 40-watt lamps each on 10-ft centers provide about 80 fc

GET YOUR LIGHTING UP TO DATE

MODERN PLANT LIGHTING trends more and more toward higher and higher footcandle levels. There's an old bugaboo—something about too much light causing excess glare—but this one's been disproved. Witness the fact that outdoor illumination on a clear, sunny day often gets up to 10,000 footcandles, and doesn't drop much below 1000 on a normal cloudy day. The latest recommended lighting levels for industrial tasks are but fractions of these values.

WHAT CAN TOP-NOTCH LIGHTING DO FOR YOU?

here are a few reasonable results ...

1 . . INCREASED *Accuracy of workmanship*

2 . . INCREASED *production*

3 . . IMPROVED *employee morale and labor relations*

4 . . IMPROVED *plant housekeeping*

5 . . IMPROVED *utilization of floor space*

6 . . REDUCED *spoilage and rejects*

7 . . REDUCED *eye strain and fatigue*

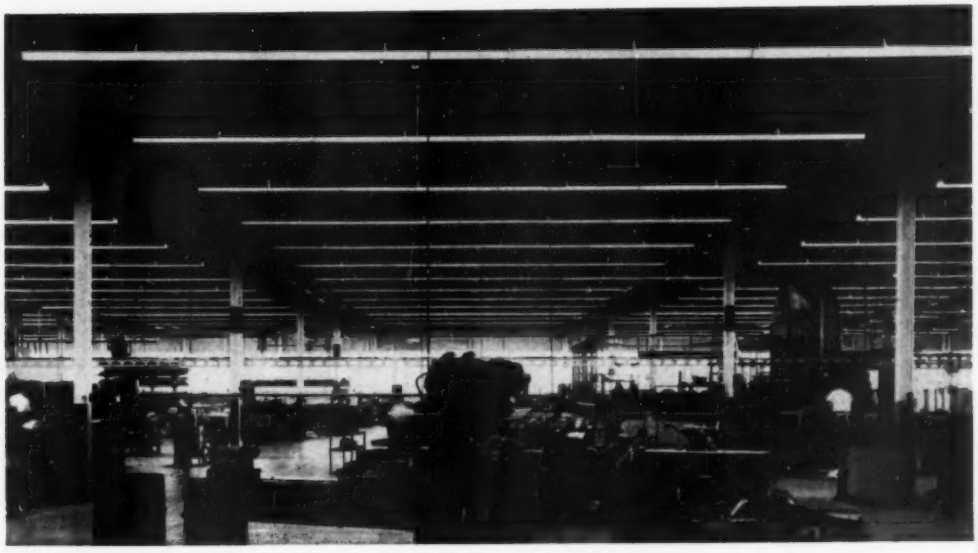
8 . . REDUCED *accident rates, lower insurance costs*

LIGHTING isn't really a complex problem. True, there are some cases where tricky techniques must be worked out by lighting specialists to fit unusual circumstances; but most layouts can be mastered by an alert plant engineer who can combine basic lighting principles with good common sense to come up with a lighting plan that contributes to production and efficiency.

Light Sources

Each lighting problem generally has an answer to the question: "Which source is best?"—that isn't too difficult to find. The choice must include considerations of economy, maintenance conditions, number of burning hours, and in some cases the amount of heat the source radiates.

Fluorescent lamps, since their introduction some 13 years ago, have proved acceptable in all kinds of plants where medium and low mounting heights are available. Maintenance difficulties restrict their application in high-bay areas,



Continuous rows of 2-lamp, 96-in. fluorescent lamps provide 50 fc or more in typical machining bays at Diamond Power Specialties Co. (Lancaster, O.)

BY E. A. LINSDAY, Lighting Engineer, GENERAL ELECTRIC COMPANY

but they are often installed as supplementary lights on machines and benches.

The fluorescent lamp is about three times as efficient a light source as the regular filament lamp. Even though initial and maintenance costs are higher, it gives more light per dollar of total cost than the filament lamp. The fluorescent lamp has a large emitting area and low brightness, which result in more uniform illumination, less direct and reflected glare, and eliminate harsh shadows.

Even though their history is short, fluorescent lamps have undergone considerable improvement. Instant - starting lamps, which do not require starters, are available in lengths up to 8 ft. In some installations these lamps are more economical than standard fluorescents. A new low-brightness lamp is suitable for drafting-room and office applications and where low reflected brightness is required for critical seeing tasks. It is installed in simple, economical fixtures that reduce initial layout costs. New fluorescent powders that coat the inside surfaces of lamps are available in compounds that simplify the different tones of white. These can result in cool or warm atmospheres, or excellent color rendition, or special effects.

Mercury lamps approach the fluorescents in efficiency. A mercury source has high intensity, and its light can be concentrated into beams by suitable reflectors. It is effective in medium and high mounting locations, but not suited to mounting under about 20 ft because of its high brightness.

Two limitations of the mercury lamp are its color characteristic and the delay in starting; but both objections can be overcome by using a combination mercury-filament system. The greenish-blue mercury light combines with the yellow-orange filament light to give a cool white. The filament lamps provide light instantly after the switch is thrown. Where power failures are likely to happen, this system provides good safety features.

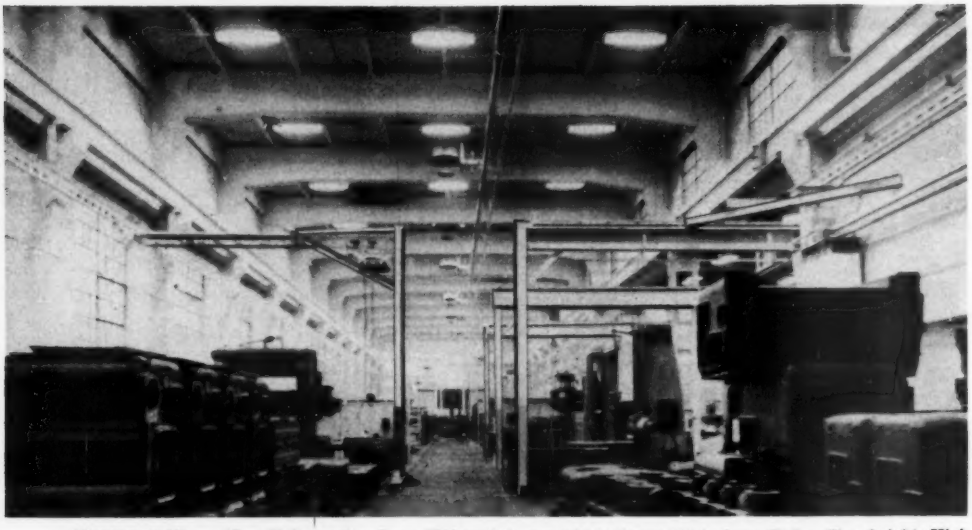
Filament lamps continue to do good lighting jobs in many industrial plants. They are used in all classes of factories at all mounting heights, and also for supplementary lighting at work level. They are particularly suited for areas which require only occasional illumination.

The filament system has several exclusive values. It has low initial cost because no auxiliary equipment is needed and because only simple reflectors are necessary. It is flexible in layout and operation because of the large range of lamp sizes and types. Silvered- and white-bowl lamps can be installed in both direct and indirect reflectors and in projector fixtures for general and special flood and spotlighting. Lamps with built-in reflecting surfaces retain their light-emitting power in locations that are high or dirty and where maintenance is difficult.

Quality and Quantity

These two classifications cover the factors in planning a lighting installation.

As for quantity: General lighting can be specified for any given industrial plant by paying attention to obvious facts—mainly the dimensions of the buildings. But special attention must be given to the operations to be performed where light may be a critical factor in production. (*Next page, please*)



Mercury units on 17 x 20-ft spacing have 3000-watt lamps which throw 110 fc from 35-ft ceiling height. High individual-lamp output reduces number of units for easy maintenance at Gross Gear & Machine Co. (Detroit)

A good example of this would be the inspection department, where good general lighting would not normally be good enough for accurate inspection. General lighting can be supplemented by specially placed luminaires (lamp plus fixture plus any auxiliary equipment necessary) which provide extra light for these critical tasks.

But quantity alone is not enough. Light quality, determined by such factors as direct and reflected glare, brightness contrasts, and color content of the light source, is equally important.

Direct glare from light sources can be controlled by proper placement and shielding of the light—including light from windows and skylights.

Reflected glare is difficult to eliminate, for it comes from shiny, polished surfaces that cannot usually be removed from the work area. However, proper placing and shielding of lamps, large-area low-brightness sources, and light finishes and light colors on surrounding surfaces minimize reflected glare.

High brightness contrasts between the visual task and its background exist in many plants where lighting fixtures are hung below a dark ceiling. To control this bad effect, ceilings should be painted a light color and the lamp fixtures should emit part of their light upward.

Color can play a more important part in the esthetic and psychological atmosphere of the shop than is generally realized. Where color identification, color discrimination, or color matching is necessary, the color of the lighting source must obviously be exactly to specifications. But in a shop where a color scheme has been worked out by a specialist for psychological reasons, a poor lighting source may throw the whole scheme out of balance, thereby undoing the work of the specialist. For such applications, the standard cool-white lamps usually give good color rendition. For the more specialized color-matching applications, there are special units which can be specified by lighting specialists.

Economy

An economic analysis of a lighting system is usually made on an annual basis, and should include the following basic costs:

1. Initial cost (fixtures, wiring, installation) amortized over a period of years
2. Lamps
3. Electrical energy
4. Maintenance and lamp replacement

All of these costs can be accurately estimated, based upon standard amortization periods, lamp-life tables, labor costs, frequency of cleaning, and current material costs. If a comparison of the costs of several alternate systems is desired, calculations can be based upon equal illumination levels and comparable estimates can be made for the different systems. After the economic decision has been made, a complete consideration of lighting quality of the different systems should be made before a final decision is reached.

Maintenance

Periodical servicing is essential if good lighting levels are to be maintained. Equipment to facilitate the cleaning of fixtures and the replacement of dead lamps should be provided. Special disconnecting hangers for high-bay locations allow the fixture to be lowered to the floor, worked on at floor height, and raised back into operating position. Portable scaffolds or elevating platforms can reach medium- and high-mounted units; safety ladders reach low-mounted units.

Combination of 400-watt mercury and 1000-watt incandescent lamps give 55 fc with good distribution in medium-bay turbine building at General Electric Co. (Schenectady)

High-wattage mercury and filament units can have fixtures with holes or slots in the top portions of the reflectors for the dual purpose of providing ventilation and allowing some light to go up to the ceiling. The slots help maintenance by allowing dust and dirt to be carried up through the holes by heated-air convection currents, thus reducing dirt deposits on reflecting surfaces.

It is economical in some plants, to start a regular scheduled replacement plan, where all lamps are replaced at about 75% of rated life. This increases the total lamp cost, but reduces labor costs by 75 to 80% because special trips by repairmen to replace individual lamps are almost eliminated. As a result, the over all cost of replacing lamps, plus cleaning fixtures (which can be done when the lamps are replaced) is often less than the cost of replacing lamps alone on an individual basis.

Cleaning can be done right along with lamp replacement. In dirty areas this may be done quarterly or more often, while cleaner areas may only require fixture cleaning semi-annually. An economical schedule can be worked out by a lighting specialist working with plant-maintenance engineers.

PRACTICAL ILLUMINATION LEVELS FOR METALWORKING SHOPS

Location or task	Amount of light(fc)
Critical inspection Finest precision work	180-300
Fine Bench and machine work Fine assembly High-speed work	80-100
Ordinary bench and assembly work Drafting room Factory offices	60
Automatic-machine operations Rough inspection or grading Sheet-metal shop	40
Plating shop Stockroom	20
Hallways, corridors Inactive storage	10

These values, like all illumination recommendations, are for maintained illumination of uniform distribution. Lighting calculations include factors to allow for lamp deterioration, collection of dust and dirt, and deterioration of reflecting surfaces so average light over a maintenance period is up to recommended level

Portable lift services close-mounted continuous rows in drafting room at Austin Company (Cleveland)

Magnetic Chucks Halve Planing Time

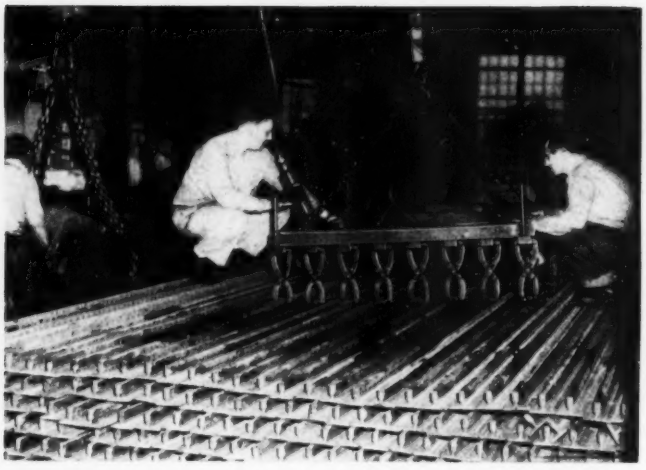
WM. M. STOCKEL, JR.
Assistant Editor

Two men now do a planing operation which formerly required three—and these have less to do. Production time per piece is cut in half and the parts have a much better finish. Setup is simplified and minimizes the danger of distortion.

Guide rails are the parts being planed and the job is at the Otis Elevator plant in Harrison, N. J. These rails presented a machining problem in that they are 16 ft long (some are only 8 ft long) and very slim, yet must be planed to relatively close tolerances. Elevators, in their travel path, are both guided and prevented from swaying by this part. Even small errors of alignment will take the smoothness out of the elevator's motion. By the original method, setup of the rails for planing was the tedious and time-consuming routine of carefully positioning each rail and setting myriad clamps.

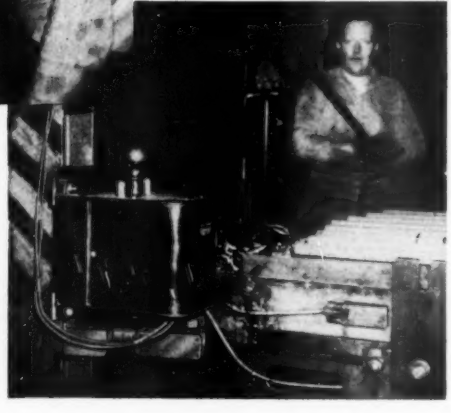
How was the problem solved? An experimental test was made with available standard magnetic chucks, using a single rail, and the results indicated that the method would work.

The O. S. Walker Company, Worcester, Mass., was asked to design a chuck specifically for



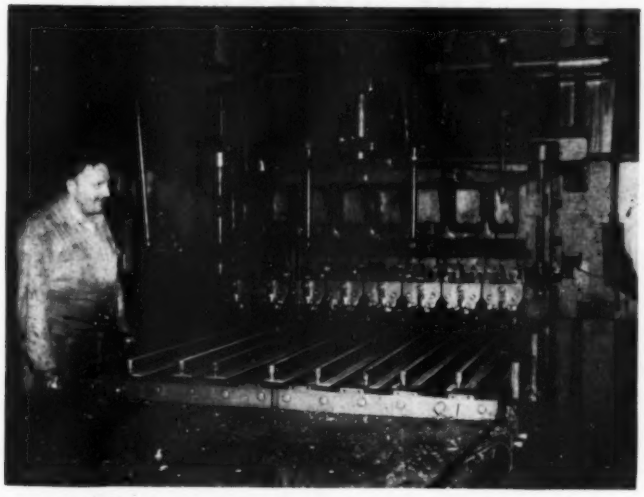
1 **Self-clamping grab** picks up 8 guide rails from stack positioned directly behind planer. Electric crane places rails, approximately located, on magnetic chuck which is mounted on planer table. Operator shifts table to forward position. Table must be wiped clean before loading

2 **Rails are aligned at 5 places** along table, using bar gages which locate between opposite sides of chuck. Tolerance for the job is ±0.005 in. Operation originally required 3 men and 100 man-minutes. It is now accomplished by 2 men in 53 man-minutes. Largest portion of saving was in setup

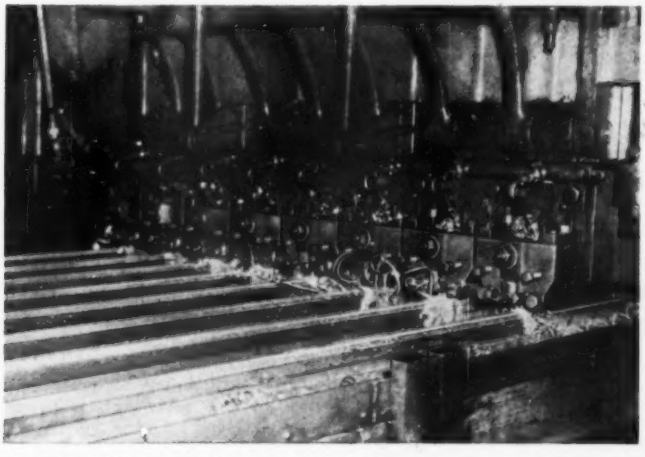


3 **Trolley-style Cutler-Hammer motor controller** is placed conveniently to handle 220-v, 20-amp, dc power supply required by magnetic chuck. Following initial alignment of rails, partial power is applied to chuck and final adjustment is made by rapping rails into position with a mallet. Then full power is utilized

Planning with magnetic fixtures, a far cry from customary application, presented no serious problem—saved time and money



4 Trial cut is taken to check alignment. After final adjustment, roughing and finishing are accomplished at 90 sfpm and 0.057-0.060 in. feed per stroke (reversing at 180 fpm—not cutting). Cutting time for 8 rails is 10.72 min; over-all machine time is 20-21 min. Rails are butted against stops, fastened at end of chuck, and staggered to prevent full load from hitting at one time as cut is started



5 Chips roll off smoothly as a result of balanced, internal, magnetic circuit. Tool is high-speed steel and rails are steel, yet neither is magnetized at any time during operation. Magnet would work equally well with a workpiece, such as a lathe bed, which is heavier and higher. In this installation, rail thickness is reduced a total of 3/16 in. After the finishing cut is taken, rails are removed from the planer with the grab and stacked at the front of the machine for transfer to a milling and drilling operation

the 50-hp Gray planer on which the job was being run. Walker engineers recommended the use of two chucks coupled to act as one. The gripping power, or attractive force, of these chucks is more than 200 psi. Chuck design is not ordinary, in that they provide balanced magnetic circuit which is essential to proper operation.

With this unusual installation, there are no magnetic lines of force "slopping-over" to magnetize the tools and the machine. There *must never be magnetic lines-of-force in machine tools*, or the end result will be disastrous. Basically sound in terms of good engineering practice, this installation proves the utilization of polarity control *within* the chuck. It minimizes stray magnetic lines both *above* the chuck and in the machine table.

Placed in operation about four months ago, the method has proven so valuable that a second installation was recently completed on a Cincinnati planer for heavier rails. There is no reason to believe that the chucks would permit slippage if higher hp—ultimately higher speeds, heavier feeds, and carbides—were used. At present the planer is working to its full 50-hp limit, cutting 8 rails at 90 sfpm and 0.057-0.060 in. feed per stroke.

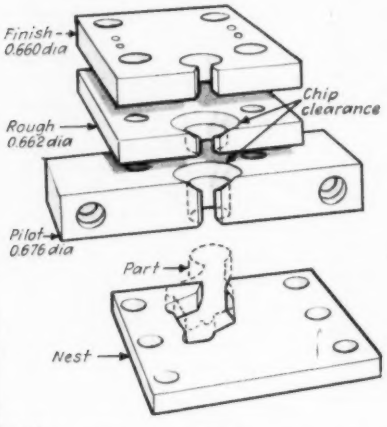
Tips FOR TOP SHOP MEN

383 You may be right—and still wrong. Justice Holmes once wrote: "The first requirement of a sound body of law is that it should correspond with the actual feelings and demands of the community, whether right or wrong."

384 Old age is not old age until it is accepted—then it becomes an acknowledgment of failure. Be careful to treat your older employes like the younger ones to help them keep a "young and successful" frame of mind. Frustrations and inadequacies are largely mental and create the sense of failure that makes a man retreat into old age.

BROACHING THE 'IMPOSSIBLE'

Part: cut from an extruded shape, the arm has a cylindrical section at one end to act as a pivot and has formed edges to make contact in the control equipment. Stock removed ranges from 0.006 to 0.014 in. thick

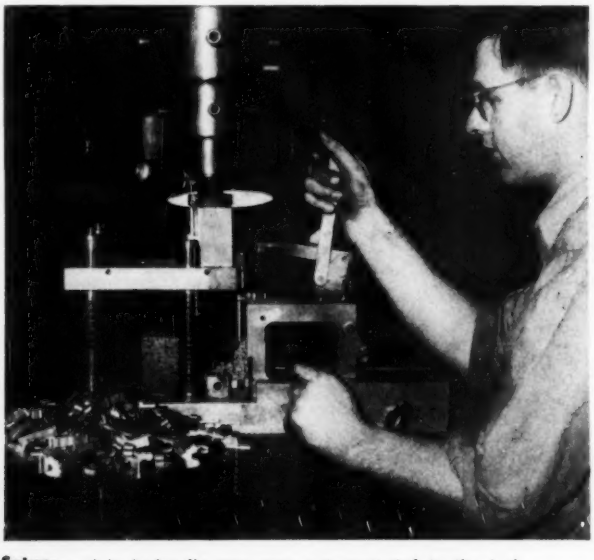


Tool: a three-plate buildup, bolted together, clears the rough stock at the lower hole, rough-cuts at the second hole, and finish-cuts at the top hole. The locating templet positions the work on the sliding fixture

The Problem: *Nonferrous extruded bars of special shape were being cut to short lengths, then hand-filed and fitted to remove excess metal from the cylindrical ends so the pieces would form pivoting contact arms for electrical control equipment ..... Time: 10 min per pc*

The Solution: *A simple, home-made broaching tool with three plates, two of them with cutting edges, and a workholder on a sliding fixture base were installed under the ram of a hydraulic press to cut the pivot ends to exact shape in one stroke ..... Time: 0.3 min per pc*

BY
RALPH WOIDA
Maintenance Dept.
Allis-Chalmers
Mfg. Co.
Milwaukee



Setup: a plain hydraulic-press ram, not connected to the tool, forces the broach block down past the part against spring pressure at the four large guide pins. A block on the base stops the slide for depth of cut; a vertical rod under the part supports its end

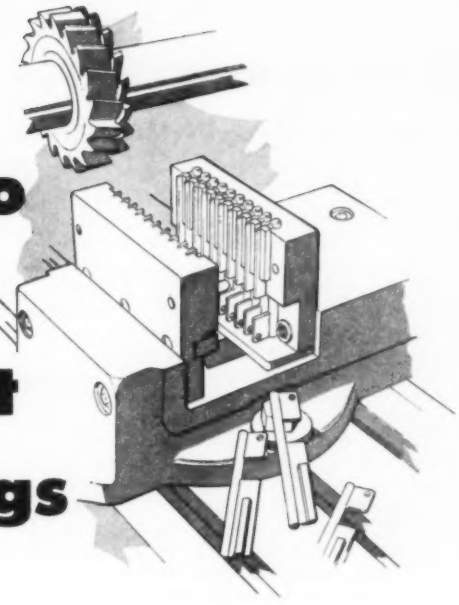
FROM hand-filing, this operation was changed first to a broaching setup under a vertical arbor press where one broaching tool made the full cut. Because of stock variations, though, that method was abandoned in favor of the setup under a hydraulic press, where the same broaching tool has two cutting edges to rough and finish the round shape to size.

The two upper plates with cutting edges are HSS, hardened, and ground all over. No relief or backoff is provided, but clearance is ground around the top edges of the holes in the lower and middle plates to allow chip clearance and to do some burnishing of the work, too. Roughing by the middle plate is done to within 0.002 in. of size, so the top plate has a light cutting load. Reconditioning the tool is simple, because the assembly can be easily broken up, and the cutting faces of the two active plates surface-ground to provide new edges. The pilot plate is Ketos steel.

The workholder slide mounts interchangeable templets to locate a series of similar parts—all with the cylindrical pivot shape at one end. A toggle clamp with an adjustable-screw jaw clamps each part on the slide.

To make the tool and fixture a complete unit, easily removed from the press, the large base carries both the fixture slide and the broach-block mount.

How to Machine Investment Castings



BY RAWSON L. WOOD, President
ARWOOD PRECISION CASTING CORP.
and DAVIDLEE VON LUDWIG, Consultant

Chief purpose of investment casting is to produce accurate workpieces that require minimum machining. Another use of the method is to obtain parts of materials that are difficult or impossible to shape by other hot-forming processes. Nevertheless, holes and surfaces must be finished in many instances because dimensional control in casting is normally ± 0.002 in. per in., or more.

Economic justification for many investment castings lies in the potentially low cost of machining them. It follows that skillful fixture design and awareness of the peculiarities of finishing investment-cast materials are essential. The cutting properties of the same material in wrought and cast forms are often quite different.

Tool designers must keep several matters in mind in order to maintain proper relationship of machining cost to casting price:

1. Fixtures must be designed so distortion is minimized, because most investment castings are small and many are thin-walled.

2. There must be common understanding by the foundry and the tool designer with regard to the reference detail in locating the part.

3. Fixtures must be designed to accommodate the tolerance spread on as-cast dimensions and not the spread for a specific sample or lot. Within a single shipment, the dimensional variations will be relatively small, but during the life of an order the maximum permissible tolerance range will be required because of uncontrollable factors.

Practical information from foundries that supply finish-machined castings are given in two ways: (1) data on speeds, feeds and depths of cut for a variety of non-ferrous and the high-temperature and ferrous alloys, and (2) illustrations of commercially used fixtures for drilling, reaming, tapping, milling, broaching, assembly and sizing operations. For the fixtures, problems of part location are explained.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

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PART DESIGN, FIXTURE AND MACHINING METHODS ALL PLAY A PART IN MINIMIZING CASTING COSTS

MANY INVESTMENT CASTINGS require some finish machining. The commonly quoted range of as-cast dimensional control varies from ± 0.002 in. per in. for all alloys which may be cast at temperatures under 2300 F to ± 0.005 in. per in. for all alloys poured above that temperature. Roughly, the division line separates the low-temperature non-ferrous alloys from the ferrous and high-temperature alloys such as those based on nickel or cobalt.

The degree of casting precision commercially practical is generally not adequate for functional details such as bearing and locating surfaces. Therefore, on the majority of cast parts it is mandatory that proper design and finishing techniques be considered, to make maximum use of the potential tolerance controls of the process.

Economic justification for many investment castings is the potentially low cost of suitable finishing operations. Hence, skill is required in designing the part to minimize machining operations and in providing jigs and fixtures. The over-all success of these efforts often determine the feasibility of a particular application of the investment-casting method.

Castings that have been properly designed and poured require the removal of 2% or less of their total mass by machining. Metal removal should never exceed 20%. The closer this maximum is approached, the more probable it becomes that redesign of the casting should be considered.

There are generalizations concerning designing for investment castings which control the economics of finishing them. Some of these are:

1. Avoid specifying tolerances to the maximum control limits on details positioned in several planes of the part.

2. Instead, provide finish stock on all critical functional details where it is mandatory to hold limits of 0.001 in.

3. Proportion the machining allowance with due consideration of over-all design complexities, total masses involved and intended procedures for removal of surplus material.

4. The minimum finishing allowance for very small parts to be machined or larger parts to be ground is 0.005 in.

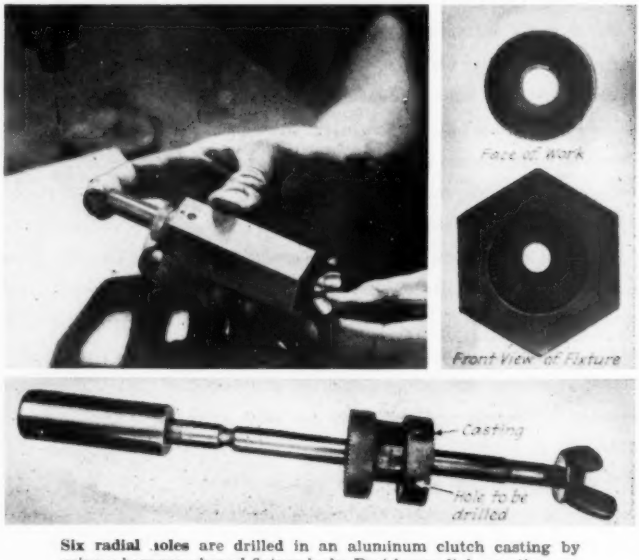
5. Average finish stock should be from 0.010-0.025 in. It is seldom necessary or justifiable to exceed 0.025 in. for finish. Only very large castings of difficult designs will permit a machining allowance of 0.040 in., which is considered the maximum permissible amount without excessively penalizing the piece price or complicating the casting procedure.

7. Optimum finish for most parts and most alloys is 0.010 in. even though the part will be finished by grinding. This limit insures maximum yield of satisfactorily cleaned-up parts.

8. To minimize tool wear, at least 0.010 in. should be removed in roughing or finishing from the as-cast surface. As a rule it is no more costly to remove 0.015 in. than 0.005 in. in finish machining.

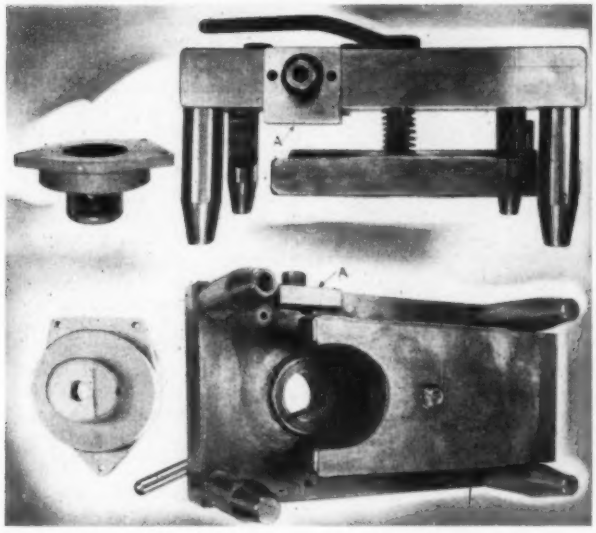
Many investment-cast alloys can be finished economically only by grinding. Most cobalt-base alloys, many nickel-base alloys and some nickel-chromium ferrous alloys are so hard or tough that they should or must be ground to size.

DRILLING FIXTURE COMPENSATES FOR CASTING ERRORS

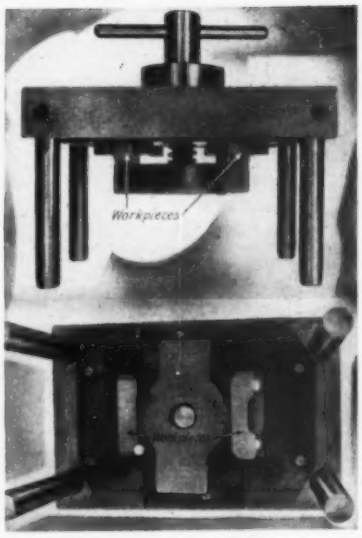


Six radial holes are drilled in an aluminum clutch casting by using a hexagon-shaped fixture body. Part has radial serrations on ends. Since axes of drilled holes must intersect axis of center hole, the bottom of fixture-body recess is hubbed with equivalent serrations. Meshing of serrations on part with those in fixture automatically centers the casting, despite any variations in ID and OD dimensions

LOCATORS IN DRILLING FIXTURES VARY WITH TOLERANCES



Exact location of small holes in large investment castings can be obtained only by drilling. Casting variations are too great. To drill holes in corner of flat-iron shaped flange, the aluminum end housing is centered by a bushing with a tapered and radiused end. Stop *A*, which moves on guide pins under spring tension, squares up the "baseline" of flange with bushing holes in fixture body



Recesses in the underside of the bushing plate hold two SAE 4140 steel castings. These are cast so close to size that no variable locating pads are needed. Clamp is turned into position by handwheel and is stopped by pin, then tightened further. Taper on recess wedges part in place

These alloys presently are available only in investment-cast form where small, detailed parts are required.

Reaming Allowance

In the machinable, low-temperature, non-ferrous alloys, reaming allowance for cast holes ranges from 0.0025 to 0.010 in., depending upon hole diameter and depth. Only very small holes through thin sections of aluminum or magnesium alloys can be or should be held to minimum tolerances, where reaming stock is less than 0.005 in. The less machinable the alloy, the more critical are correct provisions for reaming or drilling stock. Austenitic steels, nickel alloys such as Hastelloy *A*, *B*, and *C*, the monel metals, and the cobalt-base alloys require finish stock varying from 0.012 to 0.025 in. for reaming or drilling.

Threading and Tapping

Usually, it is inadvisable to cast internal or external threads. Commercial investment foundries find it impractical to cast threads to tolerances closer than a Class 1 fit. Even then, a chasing operation is generally required. Where threaded holes are required in unmachinable alloys, the as-cast thread may be the only way of obtaining the detail. On cobalt-base alloys, threads should be finished by grinding or chasing rather than by casting.

If an as-cast hole is to be tapped, it usually is best to cast undersize, ream to remove surface irregularities and abrasive investment particles, then tap. Tapping directly into as-cast holes is not satisfactory because of tool wear, but is often possible on magnesium- or aluminum-alloy parts. In such instances, it is best to specify the as-cast hole to be from 0.003-0.005 in. over the nominal tap drill size.

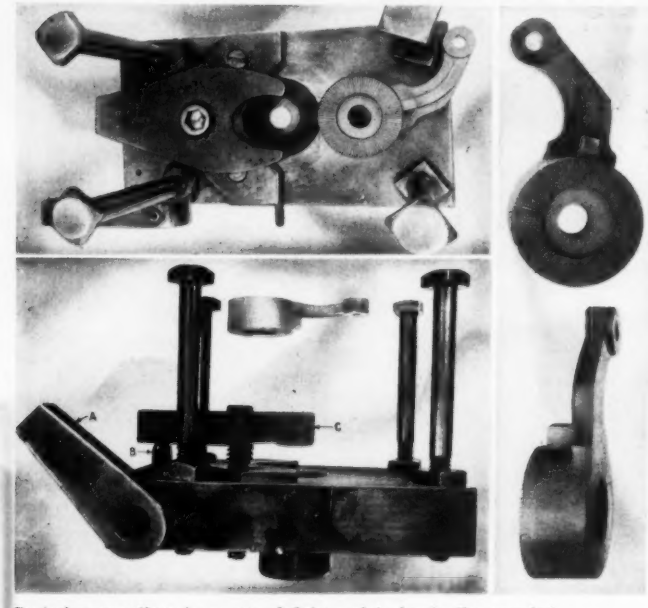
Application of Carbides

Best machining results are obtained on all of the "super" alloys through use of sintered-carbide tools. This is also true of several fairly machinable, non-ferrous, low-temperature alloys, including silicon brass. By the use of carbide-tipped tools, silicon brass may be turned, faced, milled or threaded at the maximum speed obtainable on most machine tools. The Hastelloy, monel and austenitic stainless steels may be machined with either Stellite or HSS tools but at sacrifices of 25% to 50%, respectively, or more, in metal removal rates as compared to carbide tools.

Cobalt alloys of the Vitallium family can be machined only with carbide cutting tools. This limits the minimum size of cast hole that may be reamed or drilled to about 0.250 in. for thin sections. Holes under 0.250 in. are finished by grinding. Otherwise, small deep holes may be made in cobalt metals by means of "metal disintegrator" drills.

When Stellite or HSS drills or reamers are used on high-temperature or ferrous alloys, the minimum cast hole diameter is about 0.050 in., depending upon the depth of the hole. The usual limit for

REAMING FIXTURE HANDLES NINE CLUTCH ARMS



Centering serrations in recess of fixture plate locate the serrated boss of the clutch arm. Lever *A* operates a cam that pushes pin *B* against the clamp *C* and pivots it to grip the workpiece. By reversing the lever, the clamp is released and it is returned to the open position by a spring. Arms vary only in length

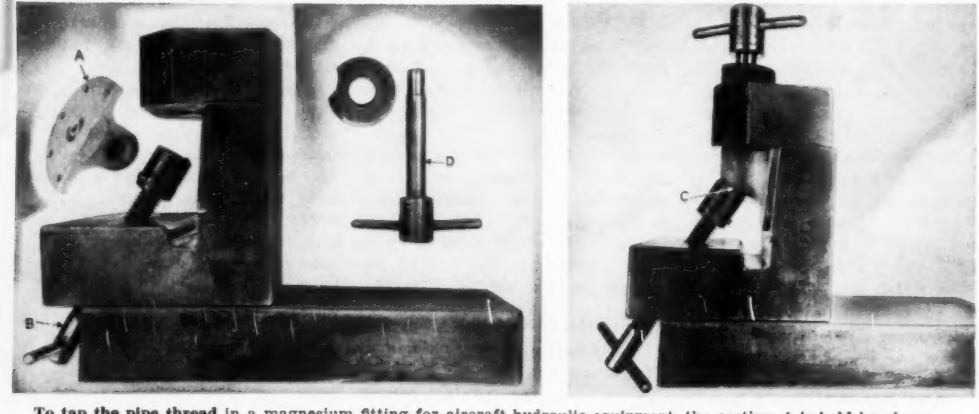
length of through holes is four diameters. Where the expense of preformed, hollow, ceramic-insert cores is justified, the ratio of depth to diameter may be extended considerably. Usually very deep, small holes in the "super" alloys must be used in the as-cast condition due to the difficulty of finishing them.

Grinding is the preferred finishing method for accessible surfaces of most investment castings. Stainless steels, nickel and cobalt-base alloys have high coefficients of expansion, low thermal conductivities, high coefficients of friction and strong tendencies towards localized overheating, galling or burning if improperly ground. Free-cutting wheels or belts are recommended for these metals. Final grinding operations should be performed with pressures sufficient to cause some wheel breakdown. This is particularly recommended in grinding Hastelloy or cobalt alloys. Finishing passes of 0.0025 in. are recommended for the super-hard ferrous and non-ferrous alloys. Constant cross feed of the wheel must be maintained. Constant flow of a suitable lubricant is mandatory to obtain control of dimensions with minimum distortion.

Drilling Methods

Standard methods for drilling and tapping are used on commercial alloys of magnesium, aluminum and copper, also the low-carbon, low-alloy steels. In drilling or tapping the stainless steels, nickel-base alloys or cobalt alloys, it is essential to maintain constant contact pressure between tool and work. For all except the cobalt alloys, standard HSS drills and taps may be used. Usually better production is obtained with carbide tools, especially for massive parts in-

HYDRAULIC FITTING IS TAPPED FROM CAST HOLE



To tap the pipe thread in a magnesium fitting for aircraft hydraulic equipment, the casting *A* is held by clamp *B* bearing against surface *C*. Pin *D* is inserted through guide bushing to align hole before final tightening

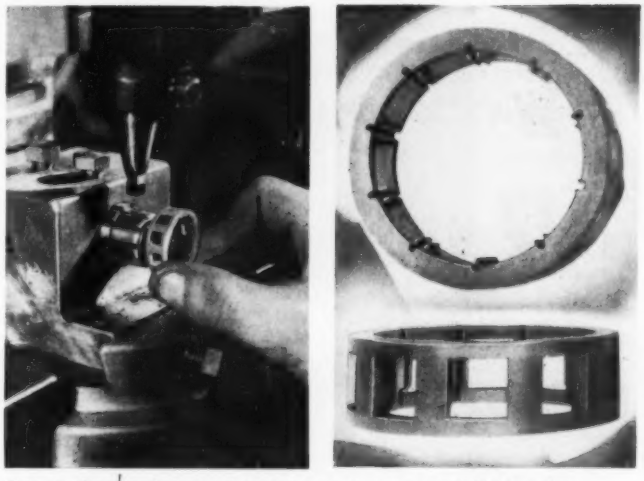
volving deep holes. When using HSS tools it is often necessary to re-sharpen several times when drilling deep holes in Hastelloy or austenitic stainless steels. To facilitate tapping of Hastelloy or stainless steel, it is recommended that tap drills be 0.005 in oversize. Thread forming or chasing is expedited on these alloys when the surfaces are turned from 0.003-0.005 in. undersize.

Structure of an investment casting in any nominal alloy type is different from the structure of the same alloy when it has been hot or cold worked by forging, rolling, pressing or spinning. This factor should be considered in respect to machining. Choice of an alloy for investment casting should not be influenced by comparative machinability of various materials suited to the application. The alloy that will perform most adequately in service should be selected. This is logical because 90% or more of the final cost is incurred during casting. If properly designed, the amount of metal to be removed in finishing is so small that comparative differences in machinability of the member alloys of a group, as well as between different families of alloys, are only of incidental interest.

This observation is emphasized by the fact that nearly all of the "free-machining" steel alloys are no more readily machined in their investment-cast form than related, less machinable alloys. For example, austenitic stainless steels such as Types 302, 303 and 304 are all about equally difficult to machine in the cast condition, regardless of annealing or stress-relieving treatments. Functional effect of the "free-machining" selenium in Type 303 is suppressed or absent in the cast structure. In the forged or rolled alloy, selenium is uniformly distributed at and along the grain boundaries. In cast structure, random distribution of selenium exists; hence, it has no actual effect on machinability. The difference in corrosion resistance between cast Types 302 and 304 is questionable. Therefore, to minimize foundry control problems, it is best to employ Type 302 for all applications where the basic 18-8 austenitic stainless is applicable.

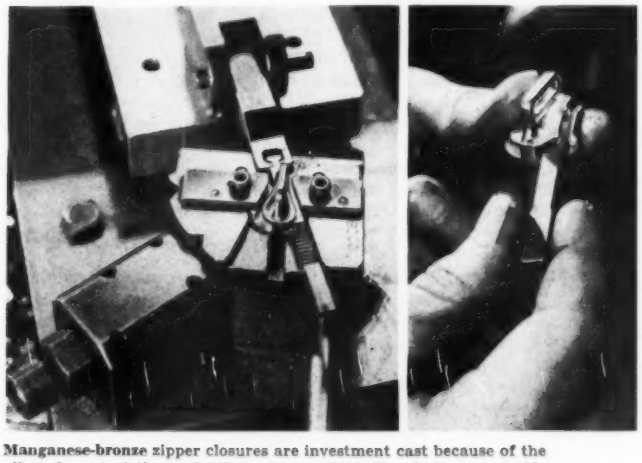
If a hardenable form of stainless steel is required, the choice should again depend upon casting difficulties rather than machining characteristics of wrought material. Type 416 stainless *in the hot-worked or cold-worked* condition it is the only free-machining martensitic stainless alloy suited for use on automatic screw machines or other high productivity tools. But the effects

BROACH FINISHES BEARING-SPACER SLOTS



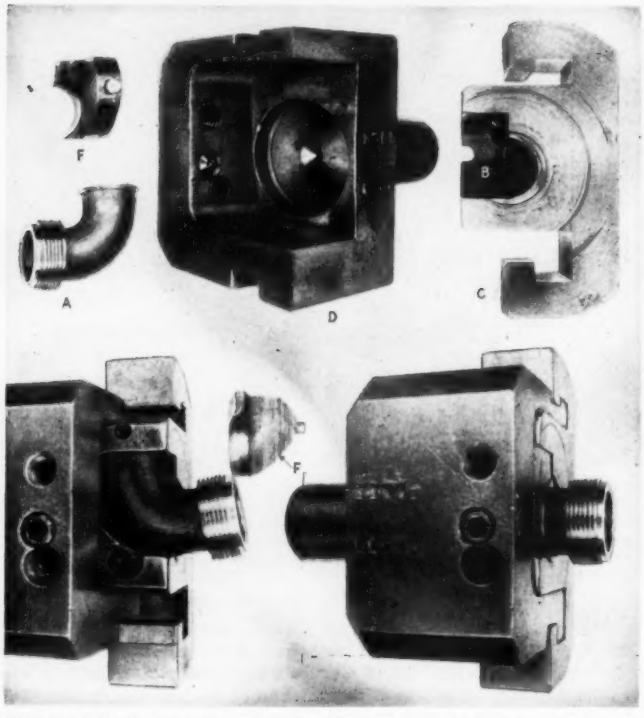
Slots in phosphor-bronze retainer-ring castings are broached to plus 0.001 in., minus nothing. Part has internal lugs that fit over grooves in arbor. Broach is foot operated. After sizing one hole, casting is pulled off the arbor, indexed one space and returned to broach next slot. Narrow slots in internal lugs are likewise broached, but using a formed, gang tool

GUIDE THROATS BROACHED IN ZIPPER CLOSURES



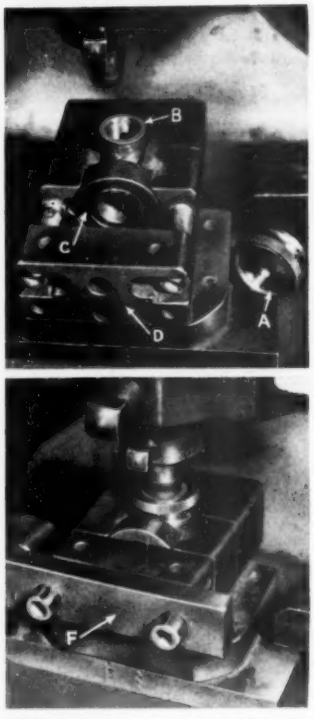
Manganese-bronze zipper closures are investment cast because of the alloy characteristics and tolerances required. Top, bottom and side clearances of guide throats are broached with a four-sided pull broach connected to an air-operated draw bar. Fixture body is swung to desired position and held by detent

FIXTURE CENTRALIZES ELBOW FOR THREADING



Threading and facing of a manganese bronze elbow must be done in relation to the centerlines of the piece and casting variations. Casting *A* is squared by recess *B* in retainer block *C*. This block is slipped into fixture body *D*. Loose piece *F* now aligns the casting in the fixture cavity. For first casting of each lot, the centerline of the fixture is referenced by adjustment of machine's four-jaw chuck gripping the shank. Part is then faced and threaded at 600 sfpm with carbide tools. Runout is less than 0.002 in. over the average lot

LOCK-RING STAKING



Knurled lock ring *A* is assembled to threaded elbow *B* in foot press. Threaded collar *C* is spun onto elbow to protect threads and to locate the piece. Slide *D* is pushed against collar and locked by part *F* dropped over two projecting socket-head capscrews. Ring is put over elbow end and casting is expanded

of sulfur additions to the basic alloy Type 410 are suppressed or entirely absent in the investment-cast form. Actually investment-cast Type 416, and also Type 410, are the most troublesome alloys currently required in invested form. This is superficially a result of surface pitting, which not only mars the appearance but often destroys the required tolerances of the part. Hence, where hardenable properties plus moderate stainless qualities are required, Types 420 or 440, or Armco 17-4 P-H should be used for investment castings.

Even for non-ferrous alloys, insistence on a free-machining material must be justified. The major reason for use of the leaded yellow brasses lies in their ease of machining in high-speed automatic machine tools. These alloys retain comparative ease of cutting in investment-cast form, but they should be avoided if possible. They are very difficult to control during casting, causing production of large percentages of scrap. Use of the nominally more expensive, less machinable copper alloys such as silicon brass, red brass or tin bronze results in production of parts which cost less when finished than when attempted in the uncastable grades of yellow brass. Straight carbon steels likewise have poor foundry characteristics in the investment process. Use of a comparable carbon range in a low-alloy steel substantially minimizes the foundry problem and reduces the piece price of castings.

There are occasional parts which necessitate the use of alloys with maximum machinability in spite of other deterimental aspects. A postage-meter stamp casting has a curved under face that must be contour milled to a tolerance of 0.001 in. Silicon brass proved unsatisfactory because of the difficulty of cleaning up within tolerance without distortion of the piece. Hence, maximum machinability was necessary to reduce clamping pressure of the castings and avoid chatter during milling. Therefore, the yellow brass was required despite its cost from casting losses. Even so, investment castings proved 50% cheaper than parts hogged from solid stock brass.

RECOMMENDED FEEDS AND SPEEDS FOR MACHINING INVESTMENT CASTINGS

ALLOY	OPERATIONS	HSS TOOLS			TUNGSTEN—CARBIDE TOOLS		
		Sfpm	Ipr	Depth of Cut, in.	Sfpm	Ipr	Depth of Cut, in.
Stainless Steels 410, 416, 420, etc.	Roughing[a]	75	0.025	0.060[b]	150	0.025	0.060
	Finishing[c]	85	0.005–.012	0.020	200	0.005–.012	0.020
303, 304, etc.	Roughing	55	0.020	0.060	100	0.020	0.060
	Finishing	60	0.005–.012	0.015–.025	110	0.005–.012	0.015–.025
309, 310, etc.	Roughing	50	0.020	0.060	95	0.020	0.060
	Finishing	55	0.005–.020	0.015–.025	100	0.005–.012	0.015–.025
Hastelloy A[d]	Roughing	30	0.015–.020	0.060	70	0.015–.020	0.060
	Finishing	35	0.010	0.030	80	0.010	0.030
Hastelloy B	Roughing	15	0.010	0.060	28	0.015–.020	0.060
	Finishing	15	0.008	0.030	30	0.012	0.030
Hastelloy C	Roughing	15	0.012	0.060	35	0.015–.020	0.060
	Finishing	18	0.010	0.030	40	0.012	0.030
H.S. 21 (AMS 5384)[e]	Roughing	—	—	—	15	0.012	0.040
	Finishing	—	—	—	15	0.008	0.020
Silicon Bronze[f]	Roughing	2–300	0.020–.035	0.010–.025	600[h]	0.020–.035	0.010–.025
	Finishings						

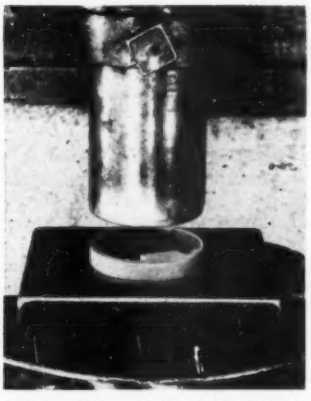
[a]Roughing cuts are not normally required on most investment castings.
[b]It is usually not desirable to exceed 0.025 in. for finish stock and 0.040 in. is the maximum necessary for the largest parts being investment cast; sand castings require 0.060 in. for roughing.
[c]A single cust usually roughs and finishes most investment castings; for very difficult operations a rough cut of 0.020 in. depth and finish cut of 0.010 in. depth is recommended; avoid attempting to finish with depths of cut of 0.010 in. on the above alloys.
[d]Hastelloy data courtesy Haynes Stellite Corp.
[e]Finishing by grinding preferred for cobalt alloys.
[f]Given for comparison with more difficult metals.
[g]Roughing-finishing in one step.
[h]Maximum speed for turning, threading and facing, but not for drilling small holes.

The opposite situation can occur too. To obtain the higher fluidity and strength plus wear resistance of less machinable silicon brass, a manufacturer redesigned a casting to eliminate all machining except lapping the printing surface of raised letters. Earlier designs required several machining operations.

Some important investment-casting alloys are overlooked because they are comparatively unmachinable, or require modified machining methods. An example is silicon bronze. This alloy possesses exceptional strength, ductility, abrasion and impact resistance, plus good appearance. It seldom is specified by engineers unfamiliar with the investment process. Compared to yellow brass, it is hard to machine and therefore too costly to use where large volumes of metal must be removed. But silicon bronze happens to be the most readily castable of all copper-base alloys. Information on the techniques required to machine this alloy is therefore given in some detail.

Silicon bronze is in the Group 3 machining class of copper alloys. It must be drilled with tools with full rake angle. HSS drills are preferred. For some high-volume

PRESS SIZES PART

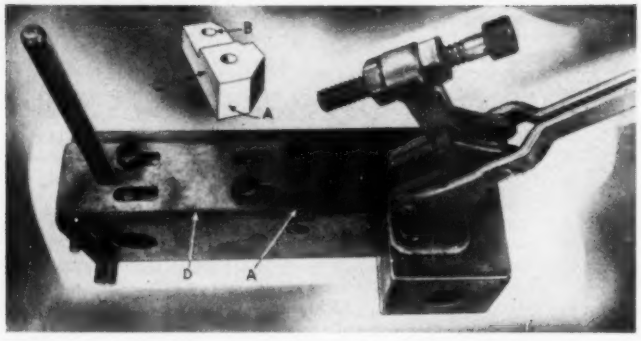


Rings with large internal bosses tend to ovalize because of unequal solification rates throughout the casting. A die is a rapid means of removing surface irregularities and rounding up the piece

TOOL ANGLES FOR TURNING INVESTMENT CASTINGS (DEG.)

Materials	Back Rake	Side Rake	End Cutting Edge Angle	End Clearance Angle	Side Clearance Angle
Copper alloys	−3 to 0	0	5–10	10	10
Steels:					
"Free-machining" low-carbon	18–22	0	–	6–12	7
Annealed tool steels, also high-carbon, low-alloy steels	4– 6	4– 6	–	4– 6	4– 6
Austenitic stainless	20	0	–	10	7
Light cuts on all metals except copper alloys	0– 5	8	–	6–10	7

MILLING FIXTURE SQUARES SMALL PART



Surface A of bronze instrument casting must be at a specified distance from cast hole *B* and at right angles to surface **C**. Casting is dropped over locating pin in fixture body and spring-operated slide *D* squares it with the path of the cutter. Distance from *A* to *B* is not critical. A quick-acting clamp holds casting while cutter removes 0.010-0.015 in. of stock from surface *A*. For limited lots, the fixture can be used on a surface grinder

runs of maximum accuracy, sintered-carbide drills are justified. Cutting speed with HSS drills is 150-300 fpm depending upon hole diameter. With carbide tools, speeds may be doubled or trebled. Although the metal does not work harden, it is desirable to maintain constant cutting pressure, flooding the work with cooling lubricant such as kerosene or mineral oil containing 10-20% lard oil.

For tapping, sharp-hooked taps should be used at speeds of 30-60 fpm with a generous flow of lubricant. White lead may be used for hand tapping operations. Milling should be done with cutter speeds of 50 to 150 fpm, and at least 0.010 in. depth of cut is desirable when cutting through the cast surface. Carbide milling cutters permit higher speeds, providing adequate means of chucking the parts are provided. Usually a single cut is taken to finish a part and it removes from 0.010-0.020 in. of stock. On small castings, cuts deeper than 0.020 in. are not recommended, because of the danger of distortion. Deep cuts should not be necessary if the parts are properly designed and excessive allowance for finish has not been made on the pattern.

Magnesium alloys, like Dowmetal C, are valuable for investment casting, but have been avoided by customers because of the dangers alleged where large volumes of chips are produced. Fire hazards are minimized in finishing of investment-cast magnesium alloys because of the small amounts of metal removed. Usually, it is possible to dispose of the chips or grinding dust as fast as formed, by providing a liberal flow of water-base coolant.

Fixture Design

Most investment castings are small. Useless care is exercised in the design and operation of fixtures, the parts may be distorted during finishing operations. Sufficient flexibility must be incorporated in fixtures to accommodate parts within permissible tolerance range of cast sizes.

Many jigs and fixtures have been incorrectly designed through the application of principles that properly relate to the finishing of semi-fabricated parts produced on machine tools. This error is in part predicated upon confusion over the word "precision." As applied to the investment casting process and parts, precision has often been taken to imply as-cast tolerances equivalent to those for the same size of object produced on machine tools. This mistaken conception is augmented when sample castings happen to fall within 0.001 to 0.002 in. of exact specified size.

While the procurement specification on a ferrous casting may provide for a tolerance of ± 0.008 in. for a nominal 1.5-in. dimension, it is probable that the major proportion of production castings will be within much closer tolerances. Nevertheless, it is necessary to provide sufficient flexibility in the fixture to cope with the entire tolerance range applicable to the casting. If this is not done, it will be necessary to scrap some parts or to provide for filing or grinding some of them so that they will enter the fixture. Usually, tools that have been designed to hold only the size range indicated by sample lots, or even to hold only the size range encountered in a single production run of parts will be of limited value or even useless.

If any substantial volume of castings is to be made, their production will probably require several runs to meet the customer's procurement schedule. Each individual run will possess an inherent tolerance range that will differ slightly from the others. Within a single shipment the variation may be only 0.001 to 0.002 in. above or below the desired mean. But during the life of an order, due to seasonal and personal factors which are practically uncontrollable, the spread will usually require the maximum permissible range. Thus, where from 50 to 75% of the parts may be within 0.001 in. of mean size, the balance will be more or less uniformly distributed over the entire tolerance range, which may be from 0.010 to 0.025 in. or greater, for very large parts.

It is of fundamental importance, where machining operations are to be performed by the customer, that the control reference detail be understood by both the customer's tool designers and the foundry source. If the reference point is a position in space within a cast cavity in the part, the technique for checking the true position of this point, prior to finishing and subsequent to completion, must be established before production of castings is started or machining fixtures are built. Unless this precaution is observed, the fixtures will be improperly made and wasted, or good castings will be ruined by incorrectly built tools.

Largest stator frame bored in the vertical-bar machine thus far is this 26-ft, 8-in. frame. It weighed 74 tons, was machined complete inside in five days

GIANT VERTICAL-BAR MACHINE AVOIDS SAG IN BORING STATORS

Boring time cut two-thirds by upending frames up to 26 ft long. ... Milling and drilling done to tolerances under 2 sec of arc with special electromagnetic indexing head

BY A. MARTINSON, Schenectady Turbine Mfg. Division
and J. G. QUINN, General Engr. & Consulting Lab.
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

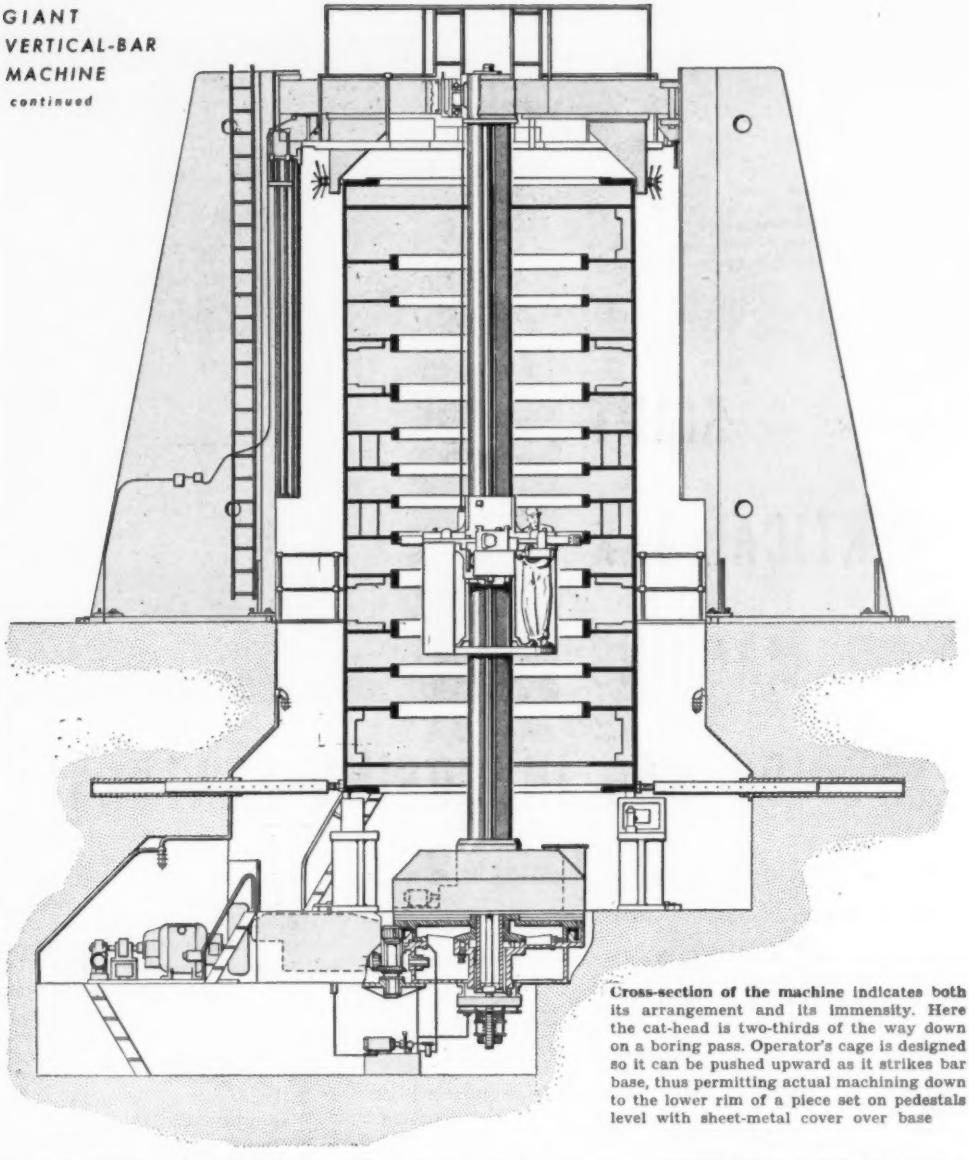
Capable of boring and facing stator frames up to 26 ft long, the giant vertical-bar boring machine at General Electric's Schenectady, N. Y., Turbine Plant is believed to be the only one of its kind. It eliminates inaccuracies inherent in horizontal boring of such large assemblies because of sag in the boring bar, reduces boring time by about two-thirds, and may also be used for drilling rib sections and milling spring assemblies. Conceived by GE engineers because it provides a simple and space-saving way to bore these large fabricated frames, it was designed and built by the Consolidated Machine Tool Co., Rochester, N. Y.

The machine is essentially an 8-ft boring-mill bed and table, set with the table top 13 ft below floor level in a 22x22-ft pit 20 ft deep. A vertical bar 35 ft long, with 22-in. OD and 14-in. ID, is supported in a holder 2 ft deep bolted to the table. A 3-armed tool- or cat-head moves up and down the vertical bar and can bore up to 96-in. diameters. Two arms, 180° apart, carry boring heads, and the third, at right angles to the other two, is the facing head. Vertical bar and cathead together weigh about 25 tons.

Set at floor level at each side of the machine, two 24-ft pedestals provide support for a removable outboard bearing or "steadyrest" for the bar and will clear a frame 12 ft in diameter. When set up for a 26-ft frame, over-all height of the machine is 46 ft, 20 ft below floor level, thus providing clearance for cranes to handle frames in and out over the permanently set bar.

The boring bar can be rotated at speeds from ½ to 8 rpm, while tool-head feeds are 1/32 to ⅛ ipr for boring, 2.6 to 10.4 ipm for milling, with a 55-ipm rapid traverse. Table oil pressure is 50 psi, and a drop to 35 psi will cause the oil-pressure switch to shut down the entire machine.

Control is entirely from a pend-



Cross-section of the machine indicates both its arrangement and its immensity. Here the cat-head is two-thirds of the way down on a boring pass. Operator's cage is designed so it can be pushed upward as it strikes bar base, thus permitting actual machining down to the lower rim of a piece set on pedestals level with sheet-metal cover over base

ant station fastened to the cat-head, and the operator rides a platform, or crow's nest, on the head. He has full control at all times or locations on the vertical bar, with these controls in the pendant:

"Start-Stop-Jog Forward-Jog Reverse" on main drive motor

"Jog Forward-Jog Reverse" to the bar through micro-jog motor

Traverse tool head up or down

Traverse facing bar in or out

"Start-Stop" on feed

Select boring, milling or facing feed

Select feed for traverse

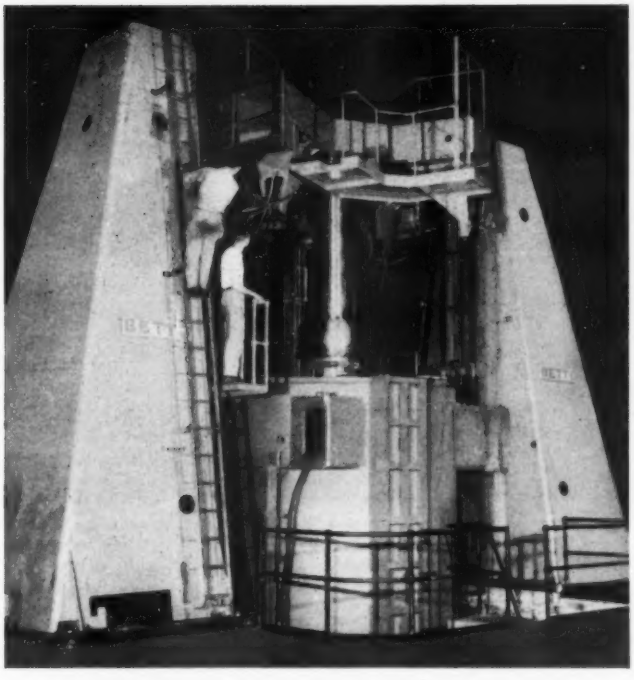
Speed adjustment for feed motor

Stop everything

Electrical current is brought into the machine through collector rings underneath it. This permits feed and rapid-traverse motors and all electrical panels to rotate with the bar. All electrical equipment is grouped under a steel hood at the bar base.

Spacing and Indexing Head

The milling head was attached to the cat-head after installation. It mills flat spots in bores to space the ribs that hold laminations which make up the core. These spots, or indentations, must be very accurately spaced, so a special, extremely accurate, spacing



Placing the steadyrest over the bar end. Four holding screws for stator are on brackets projecting downward. They hold top of job firmly in position; bottom is held by jacks in sides of foundation (see cross-section)

device was designed and built in our General Engineering & Consulting Laboratory.

To meet requirements of the Turbine Manufacturing Division, it was necessary that this spacing device be so accurate that it could lay off any angle within a tolerance of plus or minus 6 sec of arc. This tolerance is approximately equivalent to a linear tolerance of plus or minus 0.003 in. on the circumference of a circle of 8-ft diameter, which is about the normal diameter of the work handled in this machine.

The finished equipment is even more accurate than the specifications required. To show its accuracy, let's take a hypothetical example: If an angle were to be laid off, with this instrument, using a base line extending from Schenectady to San Francisco, the accuracy of the angle would be such that the desired point in San Francisco could be located to within plus or minus 500 ft. If the calibration curves for the indexing head were used, the point in San Francisco could be located to within plus or minus 50 ft!

To achieve this accuracy, the angle to be laid off is first obtained by positioning a highly precise worm wheel about 30 in. in diameter. This wheel carries one portion of an electromagnetic gage. Wheel position is determined by a precise counting of the revolutions of the driving worm. The angle through which this wheel is moved gives the base to which rotation of the vertical bar is referred.

Rigidly attached to the vertical bar is the other portion of the electromagnetic gage. With the worm wheel in its new location, the vertical bar is rotated until the two portions of the electromagnetic gage, one on each unit, are accurately aligned. This alignment is indicated on a milliammeter instrument. When the instrument indicates zero disparity between the two gage elements, the vertical bar has been accurately turned through the required angle.

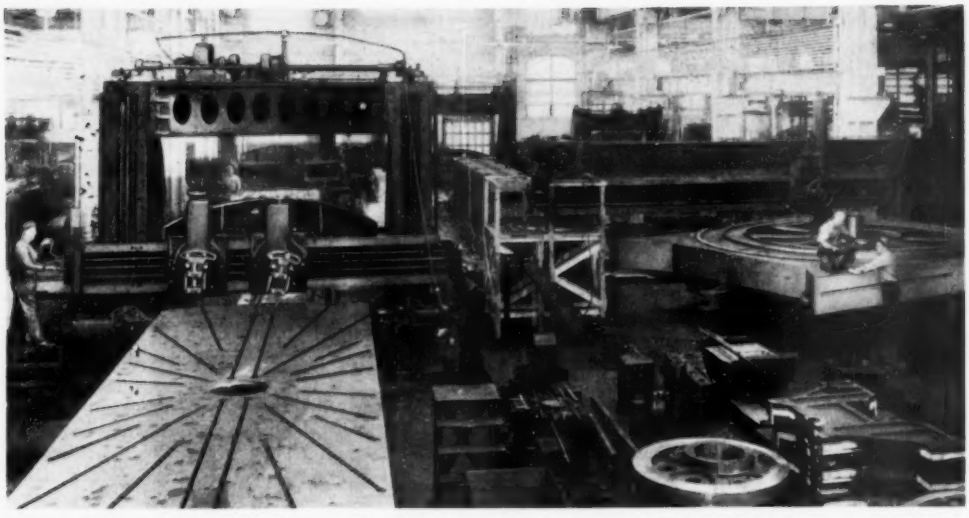
Operation of this spacing, or indexing, device, in its present application, is semi-automatic. Movement of the indexing-head worm wheel (with its gages) is controlled by a preset circuit initiated merely by depressing a start button. The circuit stops motion of the wheel at an angle within $\pm$ 9 sec of arc of the required angle. Final layout of the angle to the specified accuracy is then obtained through manual controls. Manual control for final adjustment was used to reduce complexity.

Because all angles are laid out relative to the preceding setting of the equipment, there is no buildup of error as the equipment is successively indexed to new positions. For the same reason, there should be little difficulty from wear of indexing-head components.

The universality of this indexing head is very nearly complete in that it can lay out, or measure, any angle greater than the angular tolerance of the equipment, starting from any point.

The alternator frame shown being milled on the vertical-bar machine (cover photo), has 24 internal ribs that run the entire length of the alternator. At the time the picture was taken, these ribs were being milled to form axial dovetail keys on their internal surfaces. These dovetail keys are used to anchor the core lamination segments to the alternator frame, each lamination being anchored to two keys. On this particular frame the clearance between the dovetails in the laminations and on the keys is $\pm$ 0.001 in.

After dovetails were milled, accuracy of the work was checked by passing a complete circular section of laminations, stacked to a thickness of about one inch, from the top end of the frame down through to the bottom end. This test gave conclusive evidence that the vertical-bar machine, in conjunction with the electromagnetic indexing head, had located and machined the dovetail keys so accurately that the error in space by any two adjacent keys was a maximum of $\pm$ 0.001 in., with a buildup of error between any two keys of no more than 0.002 in.



Center section of table for 43-ft boring mill is 10 ft wide. Here it is mounted on a 12-ft planer to cut T-slots. Side segments of table are attached by bolts, tongue, and dowels. Assembled table is 33-ft dia. At right, the bed of 30-ft boring mill is mounted on 20-34-ft extension boring mill for boring and turning operations

BIG TOOLS BUILD BIGGER BORING MILLS

How do you plane a 57-ft piece on a machine with 36-ft travel?

That's the type of problem faced in producing large boring mills.

Pictured here are key steps in making a 30- and a 43-ft mill

BY M. M. McCALL, Niles Tool Works Division, BALDWIN-LIMA-HAMILTON CORP.

INCREASING use of water power has brought an increasing need for large, heavy vertical boring and turning mills for machining operations on the hydraulic castings and electric generators.

Unusual problems arise in the construction and control of these machines. They must be designed so parts can be handled and machined in the builder's shop, and must not exceed the limits imposed by shipping problems.

Two machines currently being built by Niles Tool Works are a 43-ft machine for Officine Di Savigliano, Turin, Italy, and a 30-ft heavy machine for Allis-Chalmers. Pictures on the following pages show some of the unique machining methods required to build these boring mills.

The 30-ft machine has a milling head built by G. A. Gray which can be mounted on the crossrail. With this head in operation, the table speed serves as the milling feed, requiring a table drive down to 0.0018 rpm.

A single motor-driven pump lubricates the table tracks, table spindle, and table gear and pinions. Filtered oil is piped to eight places under the outer table track. Each drive box and each feed box has its own oil pump. A sixth pump provides oil for the crossrail elevating mechanism.

An unusual feature of the 30-ft machine is the complete electronic control built by Cutler Hammer. A picture of the main control station indicates the degree of control provided.

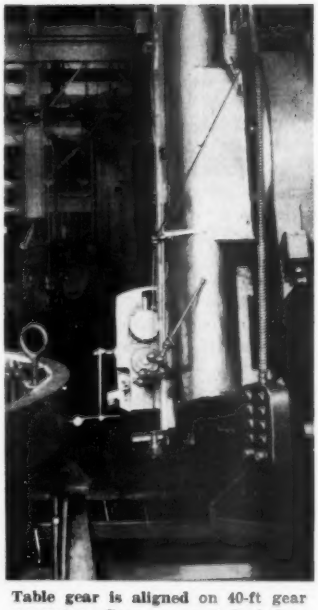
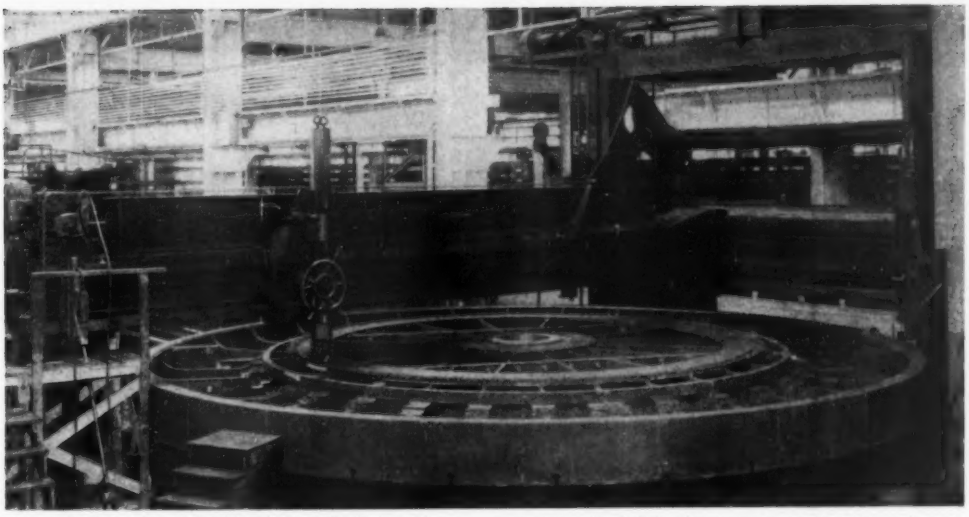
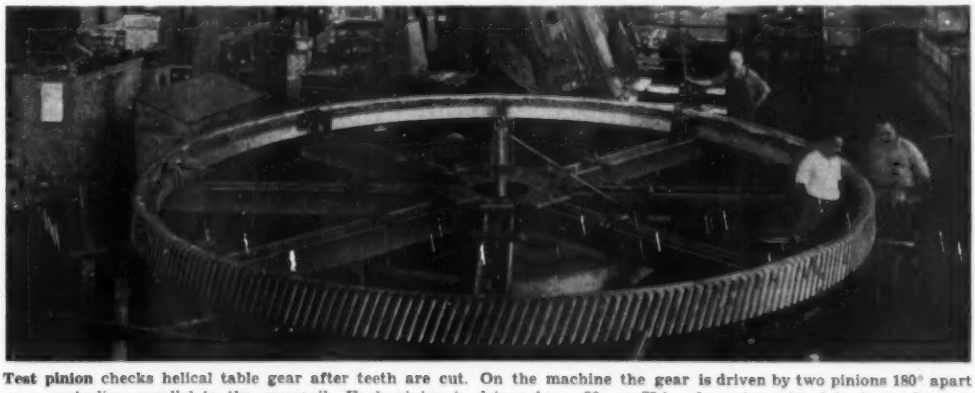


Table gear is aligned on 40-ft gear generator. Gear was cast in halves joined on the 20° helical angle of the teeth. The gear is 24-ft dia with 288 teeth of one diametral pitch

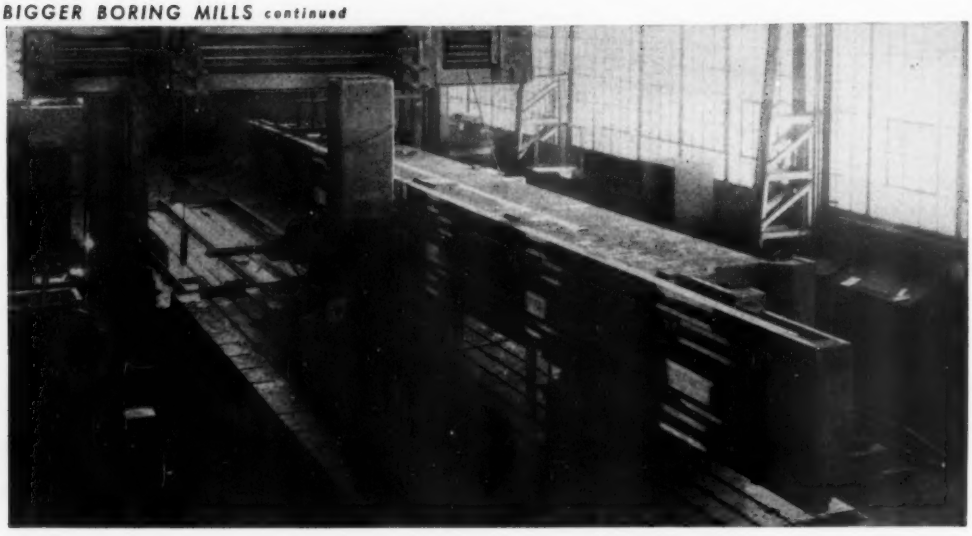


Wear track on the underside of the table is turned on a 20-34-ft extension-type boring mill. The extension arm is necessary to work on smaller diameters when the housings are extended to the rear, increasing the swing of the machine. Crossrail heads are then limited to the larger diameters

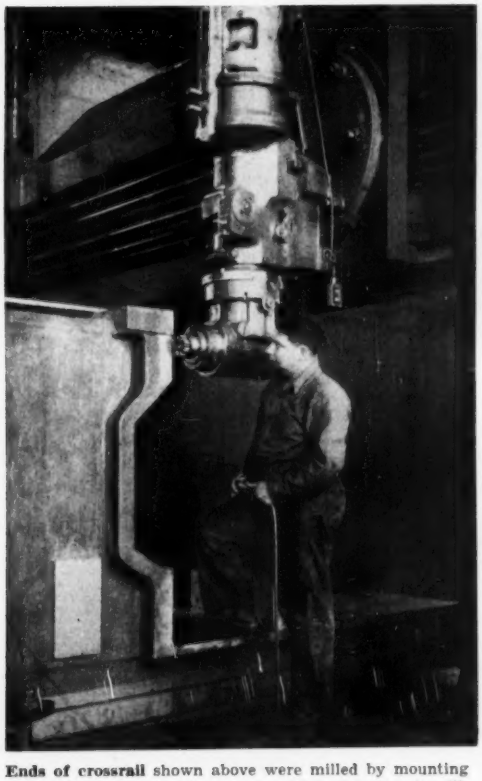
Alignment and center distance of left-hand table-drive pinion are checked on bed of the 43-ft mill. Bed is cast in four sections—two making up center portion with the table tracks, and two extensions on which housings are mounted. Bed supports the table on a wide track which is flooded by oil under pressure



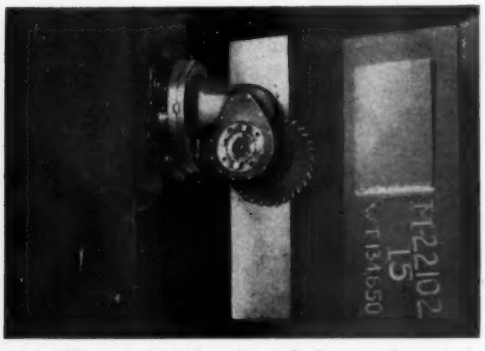
Test pinion checks helical table gear after teeth are cut. On the machine the gear is driven by two pinions 180° apart on a centerline parallel to the crossrail. Each pinion is driven by a 50- or 75-hp dc motor with 6 to 1 speed range



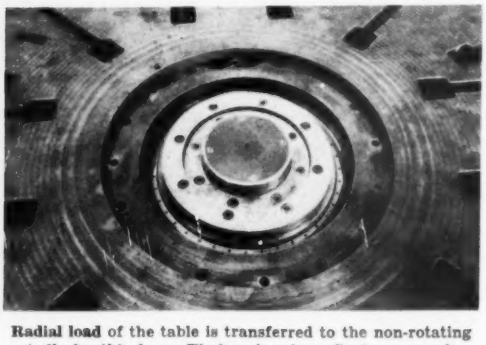
Crossrail is mounted on planer, then milling machine is set up on planer table to mill off runout prior to planing. Rough casting weighed 135,000 lb and was 57 ft long



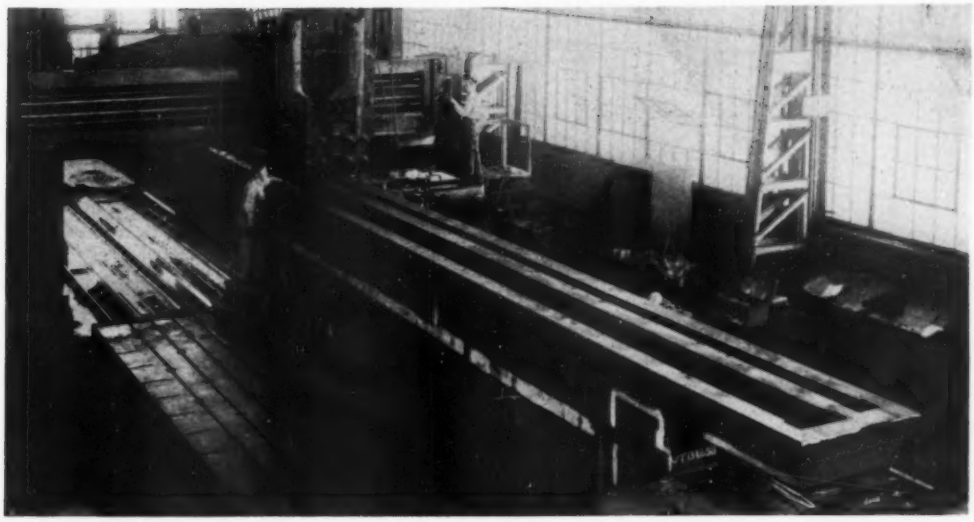
Ends of crossrail shown above were milled by mounting milling head on rail of 15-ft planer. This operation is milling of gibway



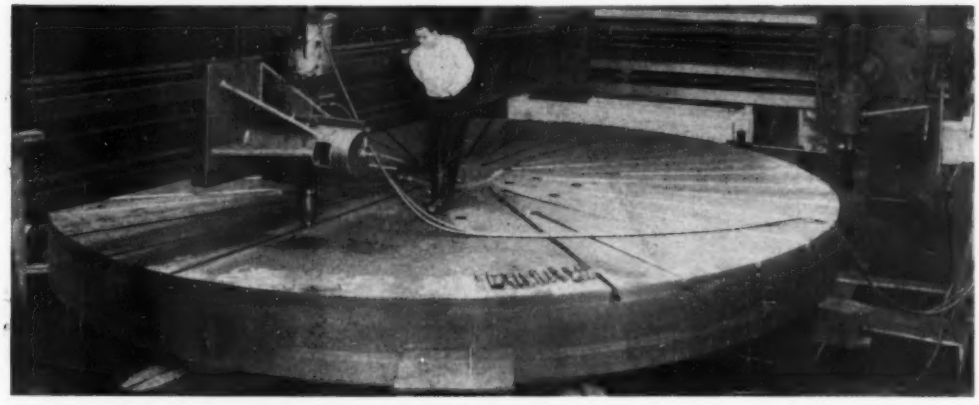
Slab milling of the pad on the end of crossrail required a different setup. Crossrail was mounted on trestles with adjustable supports and milled with special Ingersoll milling machine operation on a table

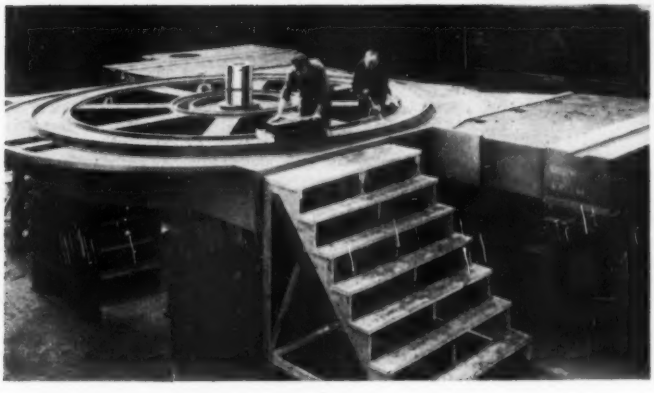


Radial load of the table is transferred to the non-rotating spindle by this large Timken bearing. Center cover has been removed to show spindle, lock plate, and bearing



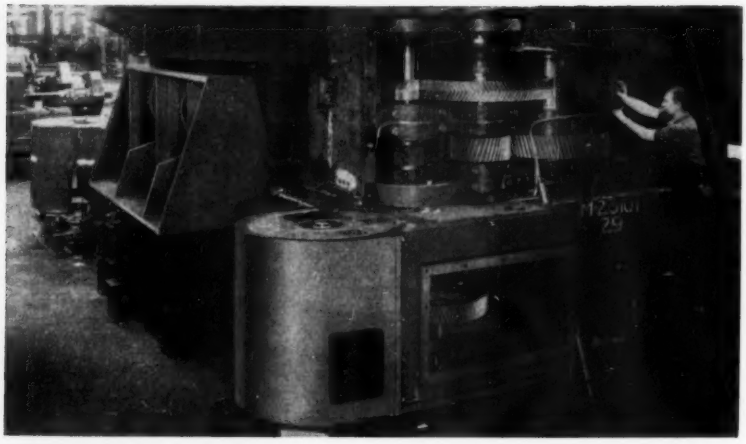
Planing the crossrail in a 15-ft planer. Table travel is 36 ft, so it was necessary to plane part of the ways, then shift the crossrail on the table to plane the remainder



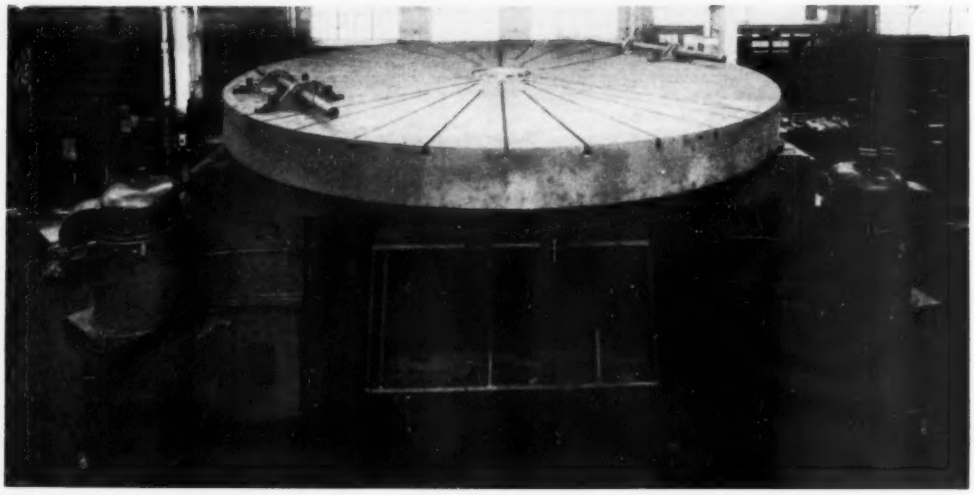


Milling T-slots in the table for the 30-ft machine required a milling head mounted on the extension arm of the 20-34-ft boring mill. The table was cast in two sections joined on the centerline and T-slots were milled from the solid castings

Scraping bed track with four bed sections temporarily assembled above shop floor. This 30-ft machine was not completely assembled in the plant. In addition to this temporary bed assembly, the table, drive mechanism, and center bed section were assembled; bed extensions were assembled with housings and crossrail



Right-hand drive unit is assembled for 30-ft machine. Drive motor is 15/150-hp dc motor with speed range from 40 to 400 rpm. Extra back-gear arrangement (lower opening) provides very low table speeds (0.0018 to 0.36 rpm) to serve as feed when milling head is mounted on crossrail. Table speeds for boring are 0.3 to 12 rpm



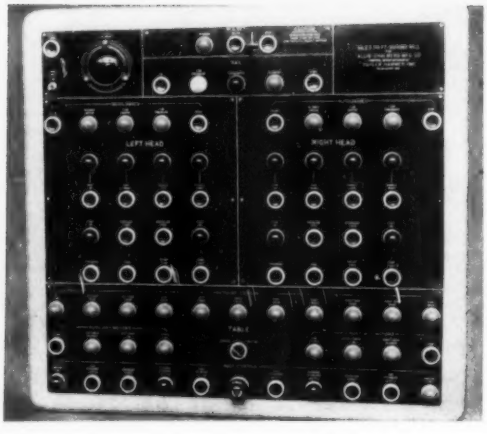


Table and drive units assembled on the shop floor. Direct current to the driving motors is obtained from a motor-generator set with a 400-hp ac motor driving a 250-kw dc generator and a 15-kw exciter which provides field currents to both motor and generator and to the table-drive motors

Main control station of the 30-ft machine is located in the console in front of the right-hand housing. Except for ratchet levers which provide hand adjustment to the movement of the bars and saddles, and the levers which change spindle speeds of the auxiliary milling head, all control is through buttons and selector switches. This requires 79 electric feed rails along the crossrail with trolleys on the heads. They provide power supply to swiveling and clamping motors on the heads, power supply to the drive motor on the milling head, control of feed and traverse to the heads, control of elevating and clamping of the crossrail, and control of table movements and table speeds. Many of these controls are duplicated in the console on the left-hand housing and in panels on each crossrail head. A pendant station may be plugged into either crossrail head and has buttons to operate the table

We Mobilize for Freedom

WHY
Controls are Necessary

One of the encouraging characteristics of the American people is their dislike for government controls. This augurs well for the future of their economic and political freedom.

But for the next few years we must not only tolerate but also help to make effective a whole battery of emergency government controls over our economic life. If we fail to do this now the future of that freedom we cherish will be imperilled. It is the purpose of this editorial—the third in a special series—to explain in simple terms why this is so.

After our military victory in World War II, we rushed through a demobilization which cut our military strength to about one-tenth of its wartime peak. Our allies did much the same thing. But the Russians maintained much of their wartime military strength and built up that of their satellites. With prodigious speed we switched from military to civilian production and went on to enjoy a rousing postwar boom—the greatest in our history.

This boom was in vigorous progress when, on June 25 last year, the Russian-sponsored North Korean army attacked South Korea. Our industrial production was rolling along at almost twice its prewar level. We had labor shortages in many key industrial areas. Under the impact of heavy buying all along the line, prices were climbing.

When the North Koreans smashed into South Korea they smashed into our national consciousness this fact: if we want a fair chance to save our national freedom from destruction by Communist aggression, we must race to restore some of the military power we had so speedily written off after World War II. And we must do it with our resources already very fully occupied with a boom in civilian business.

Program Small Compared to World War II

Compared with our military effort in World War II, the mobilization on which we are now embarked is small. At its peak, under present schedules, it will absorb no more than one-fifth of the total national production. During World War II we reached a point when nearly half of our total production went for war-making.

Moreover, our economy now is much bigger and stronger than it was in World War II. During the last decade there has been an increase of about 15 percent in our labor force. Our workers have had the training advantage of steady employment. The capacity of our industrial establishment is two-thirds again as great as it was ten years ago. Since the war no less than $70 billion has been spent to expand and modernize it.

Given time, the industrial giant we have created could pick up in its stride the added load of production for defense that now is con-

templated. But speed is of the very essence. There is little dissent from the proposition that if we are to stand off Russian aggression successfully we have, at the outside, two years in which to get ready.

Controls Needed to Prevent Chaos

These two facts – (1) the necessity for speed in our rearmament program and (2) an economy already stretched taut by a record civilian boom—create the general necessity for government controls. If we simply pile the billions of added defense expenditures authorized since last June on top of the civilian boom, and let it go at that, two destructive developments would follow. There would be a scramble for scarce materials, notably metals, which would create chaos in those markets. And prices would go through the roof.

Our situation during this mobilization is radically different from what it was when we rushed to get ready for World War II. Then we started with an economy that was coming out of a long depression. There was plenty of slack. Even in mid-1941 we still had over 6 million unemployed. Thus it was possible for us to expand war production greatly and also increase civilian living standards before the limits of our productive capacity made extensive controls necessary. But as we begin this new mobilization we find our economy already operating virtually at capacity. This fact is of key importance in understanding why this relatively small defense program so quickly requires the imposition of controls.

The selection and administration of controls thus far has been badly bungled. The threat of price controls, for example, was broadcast so vigorously and for so long that our people were virtually asked to raise prices and thereby do much to defeat the controls. Adequate taxation directed so as to attack inflation at the source and thus give direct price control a chance to operate has not yet been provided.

Indeed, we could readily assemble a long and devastating catalog of the deficiencies of the government's control program. But that would not dispose of the necessity for controls – by priority, by allocation, and, as a stop-gap, by direct prescription of selling prices – if we are to carry out our mobilization successfully. That is the only means by which a clear right of way for defense production can be cut through the highways of trade and commerce now jammed with civilian boom business.

Hope In The Wilson Plan

Since he became Director of Mobilization, Charles E. Wilson has added a new element of order and hopefulness to the mobilization program. He has laid out a plan which, if we are spared all-out war, would do three things by 1953. First, it would produce the weapons needed by our army and our allies to meet an immediate threat. Second, it would create the capacity that would enable us to move at high speed into weapons production for all-out war – if necessary. Third, it would create the additional production capacity that would restore by that date our ability to resume the climb of the American civilian standard of living.

In technical and industrial terms the Wilson Plan seems to be feasible. If it is successfully carried out, we should be able to begin getting rid of controls rapidly by 1953. But to carry out the program successfully, it must now have vigorous support from everyone. That does not mean mere agreement that it is a good plan. It means that we must conform to the controls that are necessary to make the plan work. In developing this support, the business community is in position to exercise crucially important leadership.

As has often happened in our national history, we are confronted by a paradox. We must accept emergency controls for the time being to insure survival of the freedom that they infringe. But, as we do this, we may find some comfort in the reflection that while controls from Washington are hateful, controls from Moscow would be infinitely worse.

McGraw-Hill Publishing Company, Inc.

ROUND TABLE

Boss-Made Eclipse

"I've never known it to fail, Ed! You think you're being fair by giving a worthy man a boost. Then, as a consequence, you have a half-dozen guys on your neck. Promoting Butler to the drafting room really caused me a headache."

"If the man was worthy of advancement, what kick have the other fellows got, Al?"

"Plenty!" frowned Al. "Lorring came to me and bellyached because he had been here six months longer than Butler—said he felt that he should have been given the chance."

"Well, Al," puzzled Ed, "what brought about the promotion in the first place?"

"Baskin came to me about two months ago and asked me to keep my eyes open for a young fellow who I thought would make a good tool designer. While Butler has been with me only six months, Ed, I saw that he was a good mechanic, knew where to cut corners—you know, he could tell where time was needed on a job and knew where to save time by not putting finish on unnecessary parts. The man has shown me that he has good judgment and has come up with a lot of ideas for improvement in design."

"Aren't you obligated to give the older man the chance?" asked Ed seriously. "What about seniority?"

"I question whether I was wrong in picking out Butler, because it was left to me to determine the man most fitted for the job. Lorring's a good man as a mechanic, but I question whether he would have made a success as a tool designer."

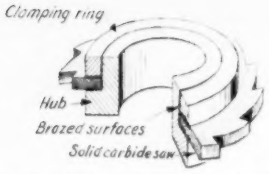
"Why don't you tell him that you'll give him a chance the next time a man is needed?"

"That would be showing a weakness in the judgment which I pride myself in having. I don't want to stand in a man's way, Ed, but Lorring just hasn't got what it takes."

"Maybe he'd show it, Al, if he got the chance. You're playing with a man's future—a pretty serious business."

"We both are, Ed, all the time. That's partly what we got paid for."

SHOULD ADVANCEMENT be based on seniority or on merit? Does a chance to succeed bring out qualities not normally apparent in a man? Your ideas and opinions on this subject will interest others. Discussions of earlier subjects appear on later pages.



Sectional view of a typical Gay-Lee solid carbide saw shows how carbide saw disk and clamping ring are brazed to form a unit

SOLID CARBIDE SAWS CUT

BY CHESTER S. RICKER
Detroit Editor

SINCE we mentioned 0.006-in. wide carbide slitting saws in "Spot News" a number of months ago, there have been many requests for more information. So we asked the maker, Earl G. Goehle, president of the Gay Lee Co., Clawson, Mich., to tell us more about various applications in industry.

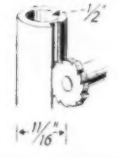
Solid-carbide saws have wide application to many industries. Large-size saws are now made as well as the diminutive one first mentioned.

Although the original purpose in developing carbide saws was to secure longer life, other advantages have been observed. One notable one is the cutting of very narrow slots in both ferrous and non-ferrous metals without raising burrs on the sides of the slot or crowding the land between adjacent saw kerfs out of alignment.

These saws have opened up new fields in cutting plastics, plastic laminates, fiber-glass pads, mica and paper.

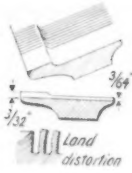
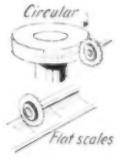
In different form, solid-carbide rolls are used as roller-slitting knives for paper and cloth; for precision, long-wearing ratchet wheels on scale graduating machines: and as circular cutoff tools.

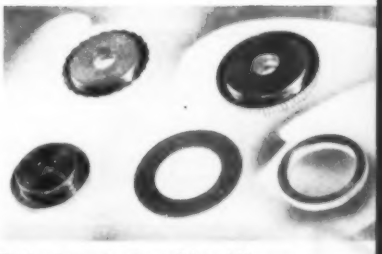
Tooth form and number of teeth are varied to suit the products to be cut and the machines on which they are used. For example, saws for aluminum have a special clearance on each side of every tooth. Single-tooth cutoff tools, working on non-ferrous materials in automatic screw machines, run hundreds of thousands of pieces between sharpenings.

MATERIAL		SAW DATA	REMARKS
Phenolic resin and copper		1.5 in. dia 0.020 in. wide 24 teeth 8000 rpm	Armature completely assembled before slotting sleeve to form commutator bars. 100 times output of HSS saw between sharpenings
Mica and copper		U-slot milled between bars. 0.030 in. width. Mica, 027 in. thick. Climb cut prevents lifting mica out of slot	Copper and mica cut at same time. Saw runs days without resharpening. Used in maintenance and production
Ceramic flux coat on welding electrodes		1.375 in. dia 0.050 in. wide 3400 rpm. Independent motor drive on welding machine	Cuts slot in glass-hard ceramic coat on welding electrode. Circuit contact roller runs in slot
Thin steel tubing		1.500 in. dia 16 teeth. Chip load per tooth, 0.001 in. Peripherial speed 300 fpm	Slots thin-wall tube without distortion, run-out or burr
Brass		1.125 in. dia 90 teeth 0.011 in. width	These cutters run over 100,000 pc between sharpening
Brass Shaft		2.05 in. dia 0.018 in. wide. 72 teeth. No burrs on edge of threads in tapped hole	Did not need resharpening after finishing 1,250,000 parts. Sometimes cut broken steel taps
Fiberglas		2.00 in. dia 0.050 in. thick 24 teeth 50,000 rpm	Used for beveling and slotting Fiberglas rectangular pieces and squares used for interior walls

CLEAN AND FAST

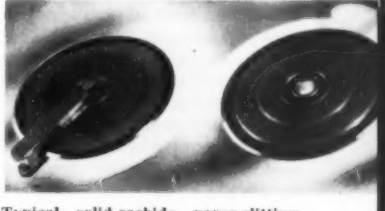
Increased working life between sharpenings solves many serious production problems

MATERIAL		SAW DATA	REMARKS
Bronze hosiery needle guide bars		0.625 in. dia 0.0054 in. wide Slot spacing 0.023 in.	No distortion of lands due to crowding as with HSS. No burrs. 180 bars slotted with carbide saw between sharpenings
Stainless Steel scales		0.375 in. dia 0.009 in. thick 24 teeth 5000 rpm	Formerly used German silver with HSS cutters. Carbide now allows stainless steel to be used. Cutters must hold edge until scale is finished to hold accuracy
Steel Knitting machine needle guide		2.25 in. dia 0.016 in. wide 24 teeth. Also 2.75 in. dia; 0.027 in. width, 24 teeth used at present time	As many as 1600 slots on some of these needle guides. Carbide saws finish slots without burrs or distortion of lands
Paper slitting knives		3 in. dia 0.005-in. radius edge. 0.25 in. wide Mounted on ball bearing	Carbide knives are used for slitting paper. Life is many times that of HSS
Cut-off tools, circular		Made in standard sizes for stock from 3/64 to ¾ in. dia	For use on B&S automatic screw machines. Are easy to resharpen and last the life of most jobs
Ratchets for hard continuous operation		Small and large ratchets for precision work and high loads	Used in accurate gage and scale work for maximum sustained accuracy



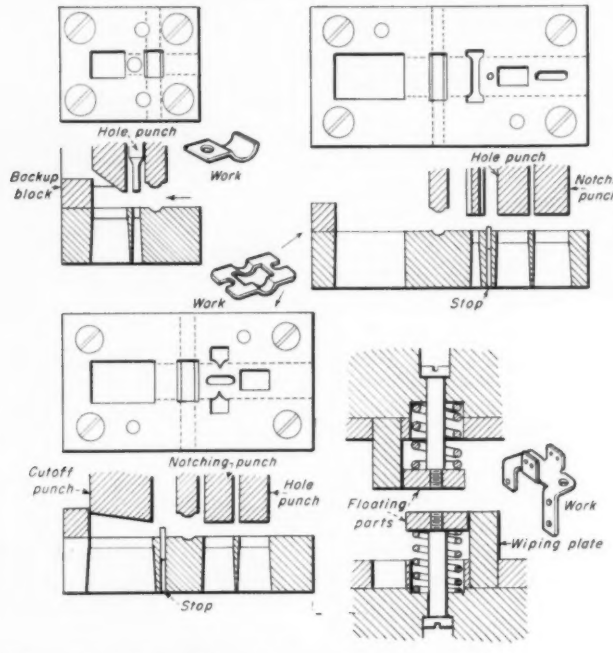
Basic elements of a solid carbide saw shown at the bottom of this illustration, from left to right; steel hub, carbide saw disk and steel clamping ring. Above at left is a 0.0009-in. thick slitting saw, at right a super-precision, carbide ratchet wheel

Graduated sizes of solid carbide saws. Upper left—0.562-in. dia saw for cutting 0.0058-in. slots in bronze. Lower left—0.375 in. dia saw for cutting commutator slots at 5,000 rpm



Typical solid-carbide paper-slitting roller. This is carried on a ball bearing, and may be ganged on an arbor or held in the fork mount at left

Practical Ideas



Simple Double-Operation Dies Speed Small-Part Production

HERE ARE several examples of dies we have built and utilized in our shop to turn out sheet-metal parts.

1. Stock is fed from right to left against the large punch-backup block, which acts as a stop. The stock is bent, pierced, and cut off, all in one stroke; producing one part per press stroke.

2. Stock is fed the same way, but for a more complicated part. Here, the stock is pierced for a square hole, an oval hole, and is notched on both sides as well as bent. The stop is in the middle of the die and is contacted by the edge of the oval hole, so the shearing punch cuts off the stock to make a notch in the end of each piece. The side notches are located to match the cutoff punch to produce rounded corners on the ends of the parts.

3. The same part as shown at (2) is here formed in a slightly different way. In this case the stop catches in the oval hole, just as with the other method, but the complete end of the part is sheared and rounded at the same time by a single punch. This punch forms the right end of the part that is finished and the left end of the part that is being pierced and bent by that stroke of the press. The result is a die that has fewer parts, is easier to make and assemble, and requires no large shearing punch.

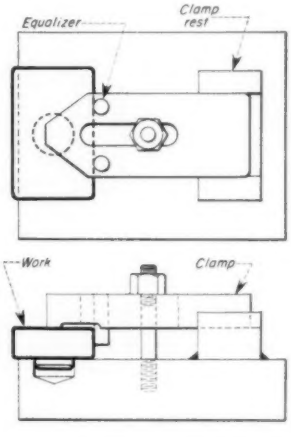
4. To make reverse bends in a small part, we made a die set that has two floating members, both supported by large bolts and springs. As the ram comes down, the two flat die parts clamp on the body of the part, and solid plates on either side of these continue to travel. Clearances are adjusted so the stock will be wiped up and down to make the sharp bends. The left-hand wiping block is actually a yoke which clears a small plate like the one on the right side. All four bends are made with one press stroke. *Masahiro Yamaguchi, Kawasaki, Japan.*

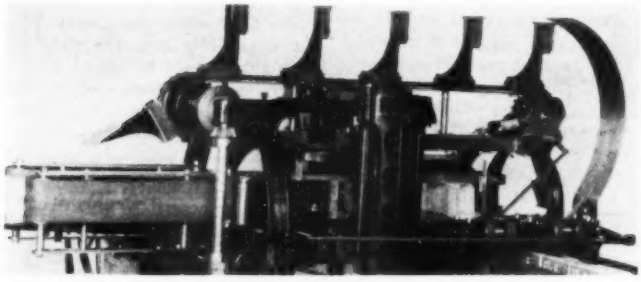
Equalizer Clamp Aligns Work Edge

WHEN WE HAD TO set up a fixture for milling one edge of a part parallel to its opposite (unfinished) edge, we made this equalizing clamp. The rig avoided fixed locating points, which we could not use because the cut had to be made a specified distance from the hub.

The fixture consisted of a baseplate, a clamp rest (slotted to take the clamp exactly, thus keeping the clamp in alignment), a clamping stud and nut, and two pins in the clamp strap. Because the slot across the top of the clamp rest kept the clamp strap in alignment, the two pins through the strap were always aligned parallel to the edge of the base.

When clamping a new part, the work was dropped into the hole in the base, and the strap was slid over it. *H. G. Frommer, Milwaukee, Wis.*





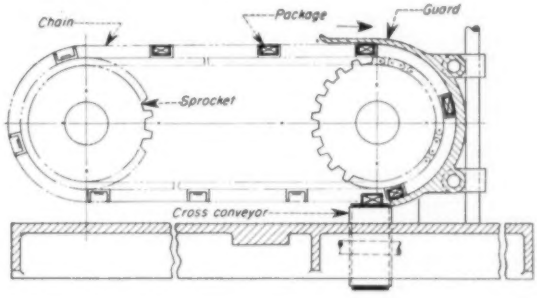
Chain Transporting Rigs Transfer Work

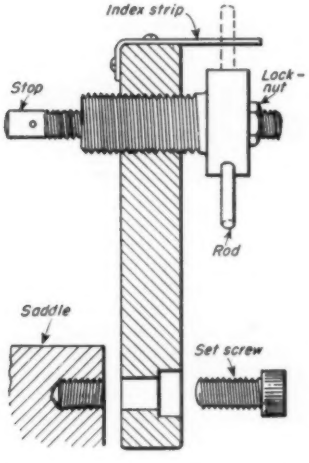
TWO SIMILAR TYPES of chain transporters are shown: the photo shows a paddle model, while the sketch illustrates a channel-carrier style. Both are primarily intended for package-wrapping operations, but the idea may be adaptable for operations in metalworking where high-production jobs require some specialized means of handling materials and parts.

The paddle mechanism is fed at the right, where a small elevator raises the package from a cross conveyor. Wrapping paper is added here, and wrapping is finished as the package moves along the conveyor to the left. As each package is lifted at the right, a paddle on the chain conveyor comes around and pushes it to the left. The continuous chain keeps paddles moving through the mechanism, and these keep the packages moving. At the left end of the mechinsm the packages emerge between two belt conveyors, which seal the joints of the wrapper by compressing the package slightly.

A simpler machine is depicted in the sketch. Here, rotation is in the same direction, but the packages are loaded onto the top of the chain, into small channel-shapes carriers. Wrapping is done at the top of the machine, and as the packages move to the right end, they go around the sprocket, and are kept from falling by the guard. This guard has a functional purpose, whereas the guard on the machine in the photo was simply to protect the operator.

As each package comes to the bottom of the sprocket, still held in the channel on the chain, it falls onto a cross belt convyeor, which carries it out of the machine and on its way. *F. H. Mayoh, Pawtucket, R. I.*





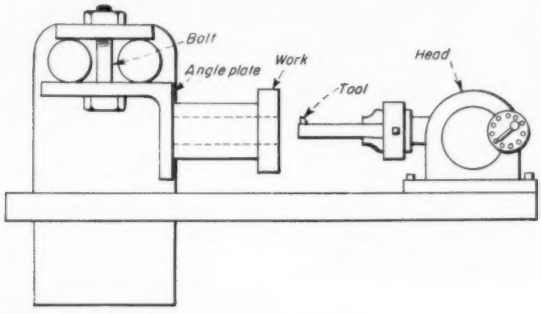
Integral Saddle Stop Aids Repeated Cutoff

WE HAVE FOUND that bar stock brought up against a fixed stop on a turret lathe will tend to become scored and to jump and wedge itself when it is cut off. This stop is retractable to eliminate both troubles.

The lathe saddle is drilled and tapped at the right end to take a bolt that holds a plate permanently. The plate is centrally located, and comes above the center height of the lathe. An index strip is screwed to the top of the plate, parallel with the axis of the lathe. Through the plate a hole is drilled and tapped to take a mild-steel bolt, and this bolt is drilled and tapped to take a smaller screw.

A locknut holds the screw firmly at one end; the other end of the screw is hardened and rounded off to act as a stop for the work. Finally, a small rod is inserted in a hole in the large bolt as shown. When a setup is made, the stock is brought out to the length necessary, and the stop is adjusted to bear against the end of the stock. The small rod is vertical and touches the index strip when this is done.

Before turning operations are started, the rod is flipped down, toward the operator, to withdraw the stop screw slightly. Thus, the stop does not interfere with the work at all. *Ian J. Peacock, Ainstable, England.*



Miller and Dividing Head Cut Special Spline

TO CUT SPECIAL SPLINES without a machine suited to the job, we made a setup on a horizontal milling machine.

First we fitted an angle plate to the overarms of the machine, bolting from the angle plate through the two supports to a flat plate on top of the overarms. We then bolted the part to the angle plate, making sure the hole to be splined was parallel with the axis of the milling table.

Next we mounted a dividing head on the table and mounted our splining tool in a short boring bar in the head.

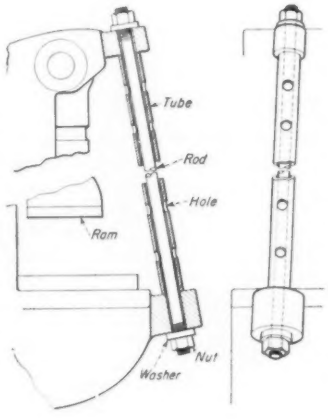
Cutting was done by feeding the table rapidly to the left. After each pass we indexed the head for the next cut, and after each revolution we reset the cutting tool to go deeper. Accuracy of the cutting was maintained because we made the boring bar a close sliding fit in the bore of the part, so the bar could not bend or wobble. *R. G. Vare, Hants, England.*

Preloaded Tie Rods Support Inclined Presses

WHEN TIE RODS are applied to the average punch press, there is always a question as to how tight the adjustment should be to keep the C-frame as rigid as possible during a work cycle.

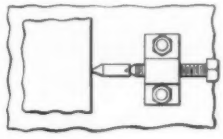
We utilize this tie-rod design. As far as we know it is not in general use, but it has been most successful at our plant.

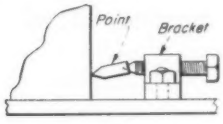
The assembly is made after the press has been carefully checked for complete alignment and the tie-rod bosses have been scraped if necessary. Heavy rods, bolts, washers, and heavy-wall tubing make up the parts list. The tubing has holes drilled through its walls at intervals. The tie rods themselves are of a special steel alloy. The washers are hardened and ground.

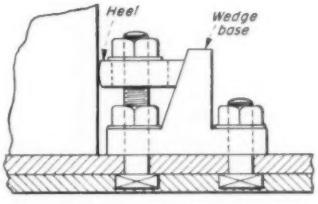


The rods are installed with the tubing around them, and the nuts are tightened. Just before the nuts are finally set, however, the rods are heated with a gas torch through the holes in the tubing. When the rods have elongated about 1/16 in. or slightly less, the nuts are brought up tight by hand.

Preloading occurs when the rods cool and contract. *D. A. Rogers, Minneapolis, Minn.*







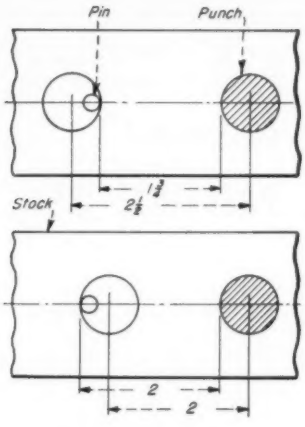
Point and Wedge Clamps Grip Odd-Shaped Work

AWKWARD SHAPES and one-of-a-kind jobs on the milling or drilling table can be gripped for machining with either of these two clamping devices.

The pointed clamp grips into the side of the work and holds it down if the tip of the point is lower than the backup screw. For this clamp, the base or bracket must be firmly bolted to the table, and the base should be cut so it will not rock. Simple points, spade shapes, and any kind of serrated tips can be utilized.

The wedging clamp is easily made, and must also be bolted to the table firmly. The illustration shows a rounded gripping heel, but this may be serrated or knurled if the work seems to demand it.

Both clamp designs allow a considerable variation in the size and shape of work they can effectively clamp down. *R. H. Fry, Surrey, England.*



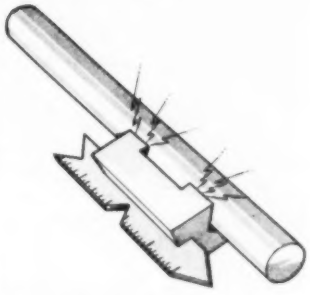
Stop Pin Locates Stock On Two Edges

TO PUNCH a small quantity of flat iron blanks with two ¾-in. holes in each blank, we made a single-hole punch and die for economy. Because some blanks had a 2-in. centerdistance between the holes, and others had a 2½-in. distance, we had to locate the stock stop carefully in the die.

We figured that if we made the stop pin the right diameter, we could locate the front edge of the first hole on the stop to punch the second hole at 2 in., and locate the back edge of the hole on the stop to punch the second hole at 2½ in.

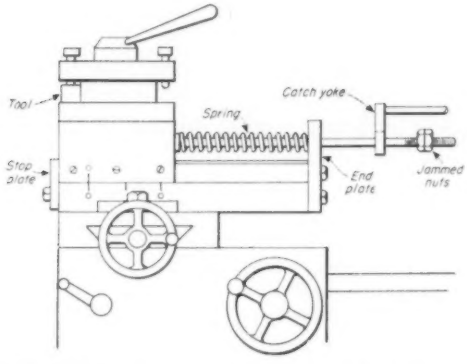
We made the stop pin ¼ in. in diameter and located its center exactly 2¼ in. from the punch. Then we pushed strip stock through the press and located for the second hole alternately at the front and rear edge of the first hole.

For the short centerdistance, location was at the far edge of the first hole; thus 2¼ plus ⅛ (radius of the pin) less ⅜ (radius of the punched hole) left 2 in. For the longer distance, we located the pin against the near edge of the first hole; 2¼ less ⅛ (radius of the pin) plus ⅜ (radius of the punched hole) left 2½ in. *Federico Strasser, Santiago de Chile.*



Center-Gage Holder Made From Magnet

THIS GAGE HOLDER can be put against the stock, where it will hold itself, leaving the hands free to adjust the tool or toolpost screw when a threading job is being set up. The holder is made from a small commercial magnet that will actually lift 10 lb. The slot through the holder is tight enough to grip the gage firmly, and the V-notch is milled to fit the average stock size. *O. F. Lambert, Columbus, O*



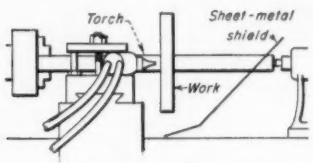
Lathe Threading Setup Cannot Jam the Tool

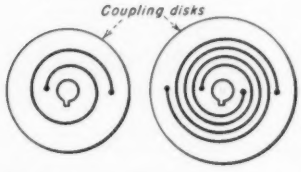
WHEN INTERNAL and external threads must be cut to a shoulder on the work, this arrangement eliminates the danger of breaking the tool and of ruining the work if the carriage should overrun slightly.

First, the screw in the slide is either removed or disengaged so the slide can move freely in the direction of the lathe axis. Next, a long rod is threaded into a hole at the right side of the slide, and this is fitted with a strong compression spring. A plate attached to the right end of the carriage confines the spring, but clears the rod by means of a hole. The outer end of the rod is threaded to take two jam nuts, and a catch yoke or slotted plate is supported from either the tailstock or the bed of the machine to catch these nuts. A plate bolted to the left end of the carriage prevents motion of the slide in that direction.

When the setup is made, the tool is clamped and the carriage is moved to the left to put the tool at the shoulder on the workpiece. Now the yoke and nuts are adjusted so they touch each other to prevent any motion of the slide to the left. In this position, the spring should exert considerable pressure on the slide.

When work starts, threading is done as the carriage moves to the left, as is normal. When the tool comes to the shoulder, it cannot go any farther because the catch yoke holds the jam nuts. However, the carriage can continue to travel some distance as the spring is compressed tighter. While this is going on, the tool is cutting a neck at the shoulder. For the convenience of the operator, it might be desirable to scribe an index line on the slide and two lines on the carriage to show the limits of this motion. *Allan Clarke, Castleton, England.*



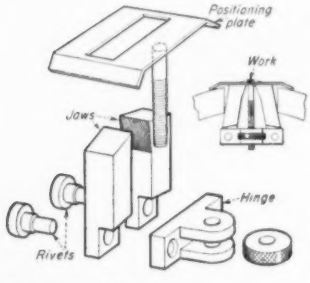


Lathe Blowpipe Setup Cuts Coupling Disk

AN INEXPENSIVE and fast way to cut helical disks for flexible couplings on a lathe is to mount a gas cutting torch on the slide and fasten the disk to a mandrel that is located between centers.

The slide (and torch) can be machine-fed outward at a predetermined rate as the headstock revolves slowly; thus cutting through the disk to make a spiral. Single or double cuts can be made in the same way.

To protect the lathe from heat, a sheet of asbestos should be located behind the work but in front of the important parts of the lathe. *Robert Laimbock, Innsbruck, Austria.*

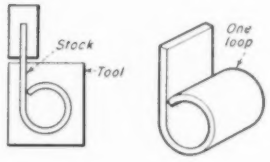


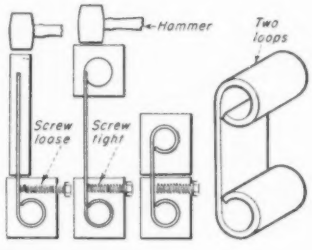
Spanner Vise Jaws Grip Tiny Pieces

MINIATURE PARTS and small assembly components that must be worked in a vise can be held to better advantage if smaller jaws grip them, thus allowing the mechanic to get at their surfaces easier. This small vise spanner will hold such parts as nails, pins, and small bolts.

There are two knurled jaws that pivot at the ends of a yoke casting on rivets. The yoke is fitted with a headless screw and a knurled nut which will move the screw up and down. The purpose of the screw is to support the bent plate, which will control the amount the jaws project out of the regular vise jaws. A hole through the plate clears the small jaws.

Because it is small, it may be easier to machine the yoke from solid stock than to cast it. *Robert Laimbock, Innsbruck, Austria.*





Bench Tool Forms Hinge Parts

LINKS for chain conveyors and fittings for hinges are made with a bench tool that is adaptable for one-of-a-kind jobs.

The tool is made by taking a squared block and drilling a hole through it, then sawing a slot to break into the edge of the hole as shown. Strip stock to be bent to the hinge shape is forced into the slot and hole, where it curls. Double ends can be made by making one end, then clamping that end with a setscrew so it cannot distort, then hammering another die onto the other end of the strip. *Robert Laimbock, Innsbruck, Austria.*

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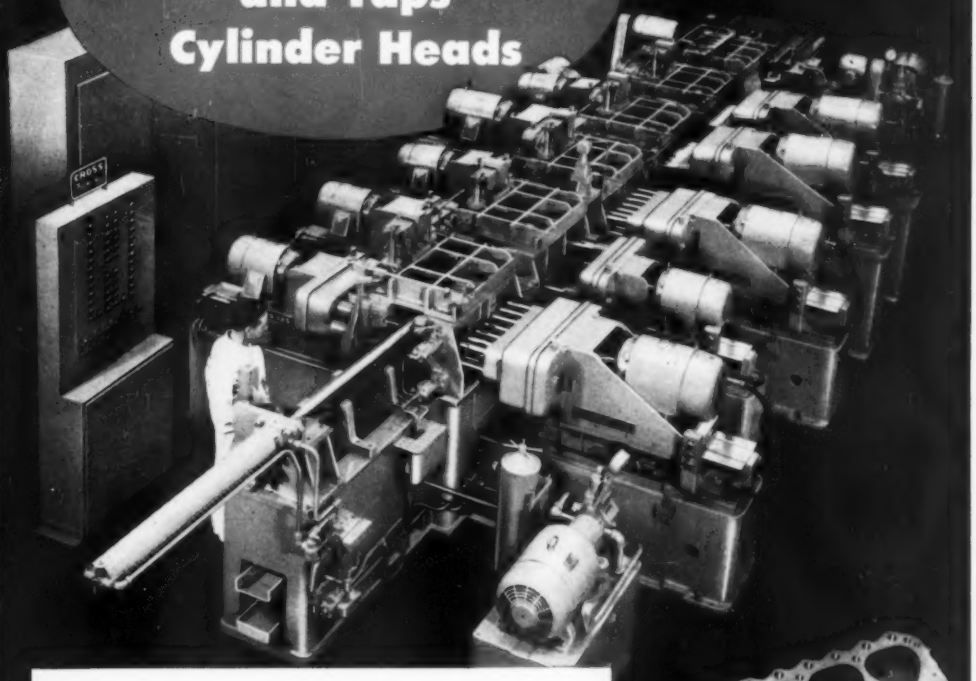

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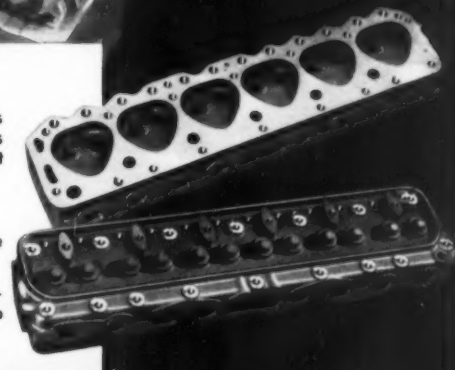

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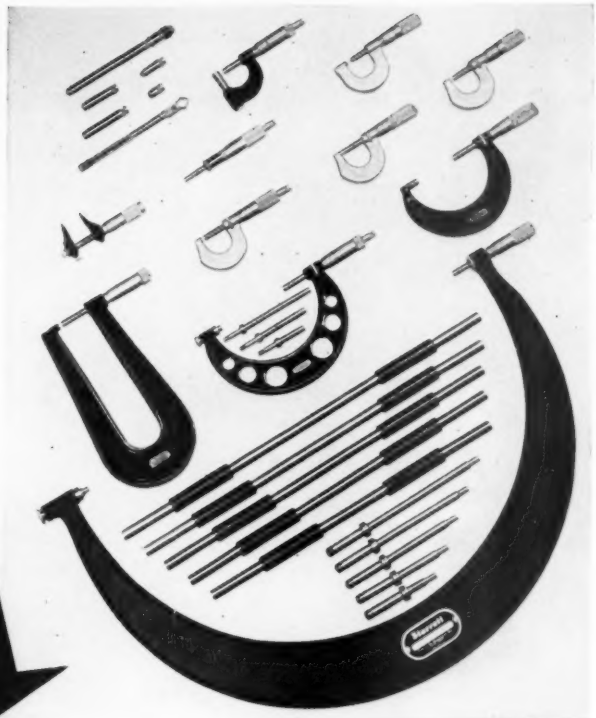

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COURTESY QUAKER RUBBER CORPORATION.

KEEP COUPLINGS FREE OF DIRT AND GREASE.

LOCATE VALVES AND FITTINGS SO THE HOSE CAN BE CONNECTED FROM BELOW.

SCRUB GREASE, CHEMICAL, AND ACID OFF COVER.

NEVER USE BELT DRESSING ON V-BELTS.

OIL BEARINGS CAREFULLY.

USE BELT DRESSING AS SPARINGLY AS POSSIBLE.

In the present emergency, proper installation and maintenance of industrial rubber products are essential to conserve a vital raw material. Failure to observe good practice is likely to be the cause of costly production interruptions because replacements are not immediately available. A number of worthwhile suggestions have been advanced by the above company in the interest of conservation.

AIR HOSE. Keep oil out of air lines. This can be done by maintaining the compressor in good operating condition. Apply the proper lubricant to the compressor. Use aftercoolers and receivers of ample size. Install water and oil separators on all air lines wherever a trace of oil is found. If it is impossible to avoid oil, use neoprene hose.

The way hose is handled by workmen has much to do with its service life. Do not pull on hose as if it were a tow line. Do not drag hose on floors or pull it around sharp corners on equipment. If hose must withstand severely abrasive conditions, select a grade of hose having a cover made to suit.

When installing air hose, locate valves and other fittings so that the hose can be connected to them from below. Top connections cause a sharp bend in the hose and shorten its life.

Remove sharp edges from hose fittings before assembly. If this is not done, the tube may be injured and its life shortened to a small percentage or normal. Keep hose couplings free of grease.

FIRE HOSE. One can never tell when fire hose will be needed. In addition to normal plant hazards, the possibility of sabotage and enemy attack cannot be discounted. Inspect hose frequently. If the hose is not used often, run water through it every three months to freshen the rubber and retard oxidation of the lining.

Fire hose should be thoroughly dry before storing, in order to prevent mildew and general deterioration. When storing the dry hose, make as few folds as possible. Rearrange hose so that folds occur in a different place. And check to see that the standpipe valve does not leak into the hose to cause dampness and mildew. Store fire hose in a cool, well-ventilated location.

V-BELTS. To conserve V-belts, select them intelligently, install them properly, and provide suitable maintenance.

Avoid excessive tension by using a sufficient number of belts of the correct size. Skimping shortens belt life. Do not use sheaves smaller than recommended pitch diameters. Bending in a smaller arc than normal distorts the belt and generates excessive heat.

Install only a matched set of belts and do not use idlers to apply tension. Never mix new belts with old ones. Set up the drive originally with tension slightly above the recommended values in order to compensate for initial stretch and groove seating, but be sure the drive does not continue to operate long at tensions above normal.

Apply well-ventilated guards to prevent excessive heat build-up surrounding the drive. Do not operate V-belts in temperatures exceeding 140F, because the rubber will be overcured and the belt life reduced. Clean grease off new sheaves before installing belts.

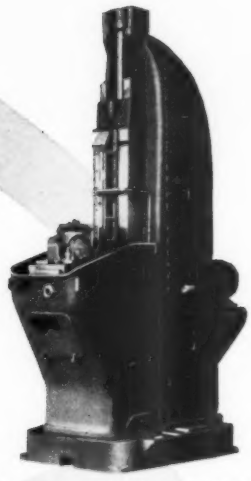
Belt dressing should never be applied to V-belts. Avoid speeds above 5000 fpm, or ask for a special recommendation. Oil bearings carefully. Wipe off excess oil so that it does not fall on the belts. Maintain alignment of belts and sheaves. Improper alignment puts uneven tension on belts, causes excessive wear on belts and sheaves. Replace worn sheaves or those having burrs and sharp groove corners.

TRANSMISSION BELTING. Standardize on as few belt widths, plies and types of construction as possible. And make sure that belts ordered have adequate capacity. Excess capacity pays off in longer life and reduced maintenance. On the other hand, do not use belts that are too thick for the drive. Never order a new belt from the length of the old one because stretching has occurred in service.

When installing a flat belt, make sure that the slack side of the belt is on top. Use the proper size and type of fasteners. Make certain that the belt ends are cut square before joining. Belts should not run on flat-faced pulleys, except idlers and shifter drives. On the other hand, see that the driving and driven pulleys are properly crowned. Excessive crowning strains center of belt.

Latest

surface broaching methods on cast iron parts teeth serrations and slots



●Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

●Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

● Whether the material is steel or cast iron, parts are being successfully surface broached on Footburt machines. Broaches used on Footburt Surface Broaching Machines have a patented tooth that is especially advantageous on heavy cuts. We will be glad to work with you on your machining problems and make recommendations based on our many years experience in surface broaching.

THE FOOTE-BURT COMPANY • **Cleveland 8, Ohio**
Detroit Office: General Motors Building

●Continuous Type Broaching Machine. Made in 4 Sizes.

FOOTBURT surface broaching

FOR DIFFICULT MACHINING WORK

. . . a time tested line of machine tools

Carbide Drills for Cast Iron . . . I

BY FRED W. LUCHT,
CARBOLOY COMPANY, INC.

Comprehensive laboratory tests, followed by production applications, have clearly demonstrated that cemented-carbide twist drills can drill holes in cast iron at least twice as fast as HSS drills. At these higher speeds, drill life is roughly three to four times that of steel drills.

In addition, carbide drills can be used to advantage even where increased speeds are not possible. Operating at the same speeds, they give a tool life around 10 times that of HSS drills.

A typical carbide-tipped twist drill is made simply by inserting a standard carbide twist-drill tip, grade 44-A. (Fig. 1), in the end of a conventional HSS twist drill. The conventional 118° point angle is ground on the end of the drill at a 12° lip relief angle, by using a 180-grit, resinoid-bond diamond cup wheel. It is advisable first to remove both the excess steel and carbide with a silicon-carbide wheel by grinding a 14° clearance angle up to a 1/32 in. wide land. Longest drill life is obtained when the cutting edges along the drill lip are smooth and keen and without blemishes. Length of the drill lips should be identical. To facilitate a free flow of chips, drill flutes should be polished.

Such drills have been produced both by carbide-tool manufacturers and by tool users who have the necessary but simple brazing and grinding facilities. A silver brazing alloy such as Easy-Flo No. 3 is used as the brazing material, as with other types of carbide tools.

An 8° RH spiral at the drill lip increased to a 15° RH spiral for the flutes through the drill body, gives a free movement of chips out of the hole.

Drilling Equipment

Special equipment, either as to machines or fixtures, is not required to take advantage of carbide drills. The same equipment can be used as for HSS drills, provided these machines are equipped with power feed and have sufficient power reserve. It is not good practice to increase speeds or feeds if the motor is overloaded to the extent that it slows down the spindle during the cut. Similarly, clutches should also be checked under these conditions.

Radial drillpresses are well suited to the use of carbide twist drills for drilling of cast iron. As with HSS practice, desirable precautions include keeping spindle end play to a minimum and checking the alignment of drill jig bushings with an indicator if drill bushings are used.

With regard to drill holders, best practice is to fit the drill directly into the spindle socket or into drill drivers. Quick-change types of holders can be used, but floating holders are not recommended.

Spindle nose sockets, drivers and drill shanks should be kept free from burrs to maintain drill alignment with the guide bushings and to keep the drill running true.

Speed and Feeds

In drilling cast iron with carbide twist drills on conventional equipment, practically any speed in the range of 75 to 200 sfpm gives good results. At the lower end of the range, tool life is roughly ten times that for HSS twist drills. At the upper end, of the range, life is approximately three to four times that for steel drills running at lower speed on the same job.

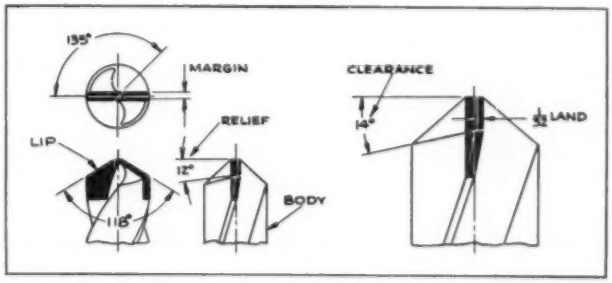
There is no necessity for reducing feeds when higher speeds are used with carbide drills than for steel drills. The selection of drilling speed (within the range of the equipment) therefore simply becomes one of balancing the increase in output against the increase in drill life desired.

If equipment permits, conditions for starting with carbides is to use the following:

Speed: Twice that for HSS twist drills.

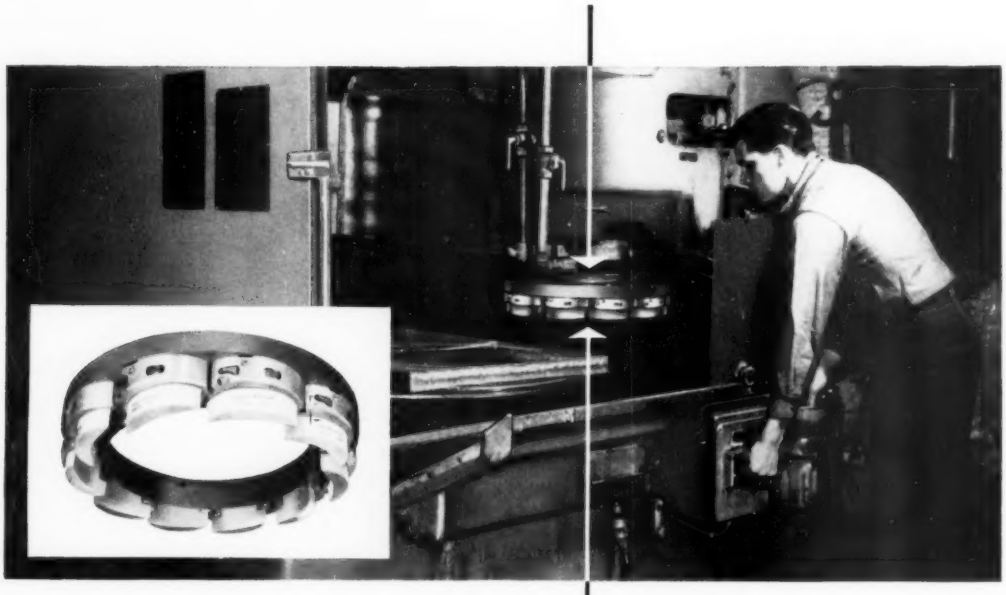
Feed: Same ipr as with steel drills.

There should be some relationship between depth of hole drilled



Dimensions and angles for carbide twist drills to drill cast iron, cast brass and bronze. For steel use the all-depth type of gun drill, not this design

New TITCOMB SEGMENTAL CHUCK SLASHES GRINDING COSTS



Check the many advantages of this revolutionary new chuck when it is used in combination with tried and proved Robertson Segments . . .

LOW COST. Novel design of segment gives the lowest cost per cubic inch of usable abrasive. By actual grinding tests, three to four inches of metal are removed for every inch of abrasive loss.

FASTER CUTTING. Unique design produces a plowing action. This, plus centrifugal force, sweeps chips and dirt from the work surface.

CONTINUOUS CUTTING. Overlapping segments assure continuous cutting . . . leave plenty of space for chip clearance.

LESS WASTE. Clamping device with safety wedge action and integral segment adjusting plate reduces segment waste. No special skill is required to load the holders.

SIMPLIFIES BUYING. Regardless of the size of the chuck, one size segment covers all vertical spindle surface grinding requirements.

If you are now using Robertson Wheels or Segments, you know you can count on them for top performance. Even so, you will be surprised at the greater production with less cost that this new chuck can give you. If you are one of the few who have yet to experience the tremendously increased output that comes from using Robertson abrasive products, then you owe it to yourself to investigate the possibilities which this new combination offers you. Let a Robertson engineer show you—right in your own plant—on your own equipment. Write on your business letterhead for a demonstration.

Today, some of the country's largest manufacturers are using Robertson Wheels and engineering services.

ROBERTSON MANUFACTURING COMPANY

TRENTON 5, NEW JERSEY

Resin-Bonded and Vitrified-Bonded Grinding Wheels • Mounted Wheels • Segments

Carbide Drills for Cast Iron . . . II

and drill speed. Speeds as high as 200 sfpm with 0.013 ipr have been used while drilling 13/16 in. holes up to 5½ in. deep without breakdown of the braze from increased temperature. For drilling holes deeper than this, it might be advisable to use somewhat lower cutting speeds (but not lower than for HSS drills) when starting a job.

Drill feeds between 0.008 and 0.013 ipr have given good operating conditions. Lighter feeds contribute at times to erratic cutting action evidenced by objectionable vibration or "sing." To avoid sing, increase the feed per revolution. In general, this will also increase the number of holes per grind.

In general, it is better practice to increase output with carbide twist drills by first increasing feed rather than speed. Output can be increased more effectively (with maximum tool life) for the harder cast irons by retaining the same speed as for HSS drills but increasing the feed.

Operating Conditions

It is always good practice to start drilled holes from machined surfaces. When carbide twist drills are used in setups not employing bushed drill jigs, it is advisable to spot drill. Conventional practice of center punching followed by spot drilling is quite satisfactory for carbide drills, too. Carbide spot drills preferably should be as short as possible to insure that the holes will be located in a manner that will give minimum runout.

Whenever possible, it is desirable to drill holes in cast-iron parts from the solid instead of using them to enlarge a cored hole, because of uneven stock removal. Runout combined with scaly and sandy work surfaces, shortens drill life.

When setting up a new carbide drilling job, it is advisable to record the number of holes drilled for a given set of speed-feed conditions for several runs to obtain the trend of holes per grind. Two or three trial runs may be necessary to determine most effective speed range. Drills should not be allowed to become excessively dull.

These data can then be used not only to determine best operating conditions but also to indicate the number of holes after which a drill should be removed for sharpening. Usually the best thing to do is to set the drill-change time at 50 to 100 holes less than the minimum obtained in the trial runs. Carbide drills should be removed for sharpening before they become really dull, for maximum life.

The consistency with which carbide drills operate, when correctly applied, makes this practice entirely feasible. For instance, on a difficult job where drills had chipped after runs of 750 holes per grind, no difficulty was experienced when the drills were changed after each 700 holes.

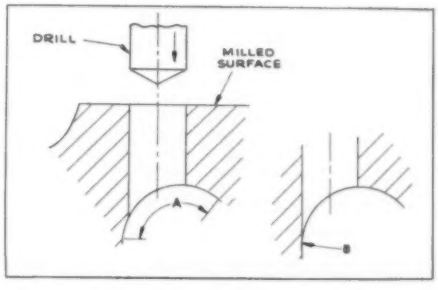
Cutting Oils, Coolants

Practically all drilling of cast-iron parts to date has been done dry, because this practice holds the range of temperature fluctuation to a minimum, thus contributing to longer drill life. In cases where a coolant must be used, a soluble-oil solution will be satisfactory. However, the shock from the coolant hitting the hot carbide as it is pulled out of a hole may reduce the number of holes per grind as well as shorten drill life. Under such conditions, operating the drill in the lower portion of the carbide drill speed-range will lower the cutting temperature and improve drill life.

An automatic valve arrangement whereby the coolant is shut off just before the drill is pulled out of the hole and is turned on again just before the drill starts to drill, will also prove helpful.

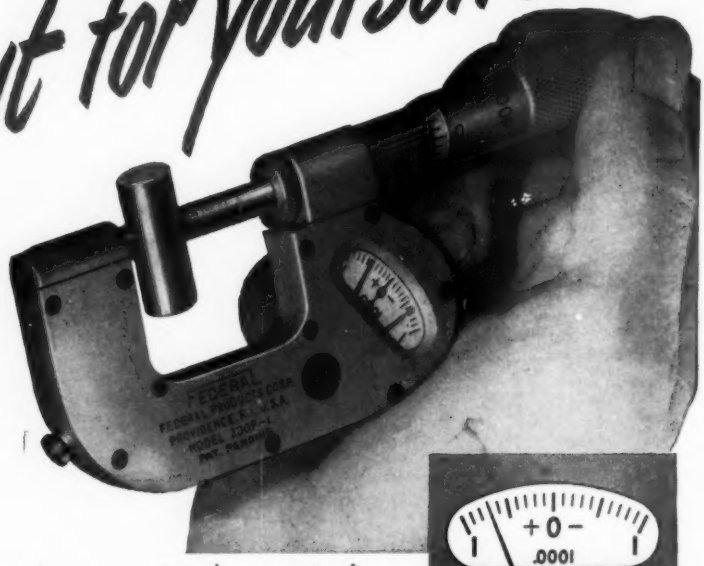
Drilling Other Materials

Such materials as ordinary cast brass and bronze also can be drilled with carbide-tipped twist drills at the higher cutting speeds and feeds. These carbide twist drills have not as yet proved satisfactory in the drilling of steel and are not recommended for that purpose. For such materials, modified gun drill styles such as the 'all-depth' type of drill are preferable. For holes above 1¾ in. dia, carbide trepanning tools offer interesting possibilities for faster drilling of steel.



Start a hole from a machined surface. In example *A*, the drill broke through rough, scaly and sand impregnated surface. A cored hole is not desirable, because, as at *B*, shifting of the core can cause trouble and chipping

Find out for yourself....



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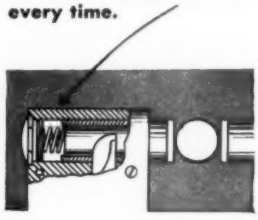
You've used regular "mikes" for such a long time you'll be amazed at the downright accuracy and plain honest-to-goodness convenience you can get with this CONSTANT PRESSURE, INDICATING MICROMETER. Just try it and you'll know why so many are buying it!

You'll discover the Federal MIKEMASTER has more worthwhile advantages than any other micrometer. It's the first really new micrometer made in this country in years. Once you've used it you'll recognize its superior accuracy — and you'll appreciate the convenience of reading an indicator instead of barrel graduations. You'll see how easy it is to check out-of-round and taper, too. You'll find its "repeat" accuracy matches some of your laboratory gages even though it sells for so much less money.

You'll also be pleased with the usefulness of the pushbutton Retracting Anvil and the Tolerance Hands when measuring duplicate parts. You'll find extra value in the *lapped*, Tungsten Carbide Anvils — and you'll just naturally like its nice balance and its *rust-proof*, dull chrome finish.

You don't have to take our word for it. Find out for yourself. Ask to see the Federal MIKEMASTER . . . and to try it on your work. Write to Federal Products Corporation, 1125 Eddy Street, Providence 1, R. I.

You'll appreciate the convenience of reading the Indicator instead of barrel graduations. The *constant pressure* of the anvil means constant measuring pressure every time.



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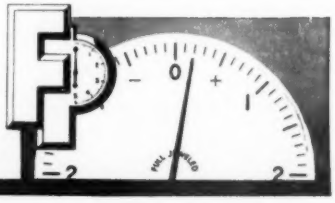
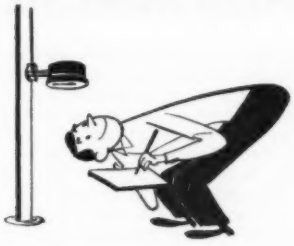


TALKING SHOP



Clean Gage Glasses

HOW DO YOU KEEP air and gas gages clear of dust and dirt in a heavy-industry welding shop where it only takes a day or two of exposure to make them unreadable? At GE's Erie Locomotive plant they turn them all upside down—leaving the gage faces on the bottom where they can't trap grime. They're not as easy to read that way, but how often do you check a gas gage, anyway? If the gages are located high enough—about shoulder height—they aren't too difficult to see if you bend down slightly.

Chip Problem

IN APPLICATION of high-rake (30-35° radial rake, 10-35° axial rake) milling cutters, the most difficult problem is chip disposal, according to Walden F. Sinawski, supt. of methods at Jones & Lamson (see *AM*, April 3, 1950, p122). The high rake angle causes a shearing action, so chips do not compress but form ribbon chips of thickness very close to that of the feed per tooth. The chip tends to stick in the fairly acute angle in conventional cutters unless the gullet is double-filleted to curl the chip. In inserted-blade cutters, the chip must be permitted to collapse and be ejected by centrifugal force. Thus, feed per tooth must be sacrificed on deep cuts so the chip can fold without any great backpressure, which would be fatal to the fragile cutting edge.

It is also important to regrind the cutter slowly, so the thinner section of the tooth tip is not burned. Feather edge from grinding must be honed off. Wheels must be kept clean and sharp, and cannot be dressed with pumice to refine the finish, because the resulting burnishing action creates too much heat.

Management's 3 R's

ACCORDING to a man in the advertising business, when it comes to the reception of new ideas, bosses roughly divide themselves into three classes:

The *Resistor*, who simply doesn't want new ideas.

The *Receptor*, who passively receives new ideas, but isn't enthusiastic; doesn't exactly encourage them.

And the *Reacher-outer*, who deliberately goes out of his way to get new ideas—from his own people, as well as from outside sources. Maybe they're not all *good* ideas, but at least he has a large selection to choose from—and something to base his decisions on.

For the Long Pull

TUBE-BENDING MANDRELS and other forming tools often require a highly abrasion-resistant surface on a strong deformation-resistant core. Very hard surfaces, over relatively soft cores, will crack with the slightest overloading.

Fred Block, Eldorado Tool Co., Milford, Conn., had this problem—and solved it by using a group A-2, 5% chrome, air-hardening tool steel to make the part (*AM*, Dec. 11, '50, p147). Tool is hardened to full hardness and *double* tempered (cooling rate is very important), after machining, then it is nitrided at 900-1000 F. Result is a 72-75 R_c case over a 58-60 R_c core. This steel is only drawn to 58-60 R_c at conventional nitriding temperature. Tools treated in this manner will withstand abrasion and high continuous loads, but are not recommended under impact.

Longest RR

THE ERIE RAILROAD on May 14 celebrated its 100th anniversary. When completed, it was the longest railroad in the U. S. running from Piermont-on-Hudson, N. Y., to Dunkirk on Lake Erie—446 miles.

Precision Coal

ONE OF THE largest precision boring machines thus far built is now making heads for coal-mining machines. Necessary accuracy and limited production made this type of machine tool advisable. Bed length is something over 10 ft.

Keep It Clean

MAKING WORK AREAS clean, encouraging workers to wear clean and neat clothes, providing even ash trays at assembly benches where smoking is permitted—these are the methods one instrument maker reports are helping to produce more careful work.

Bulldog

WHEN CADILLAC contracted to build the Walker Bulldog Tank at its Cleveland Tank Plant, it found that two 24-ft boring mills were necessary. Manufacturing time on such machines is over a year. However, with engineers of Consolidated Machine & Tool Co., Cadillac engineers decided that then readily available 12-ft boring mills could be used if columns were set out to clear 24 ft. Thus the first "24-ft machine" took only 5½ months to build, cost only half as much as a 24-footer, including adaptation of a grinding head to the machine. Units weigh 114 tons each, stand over 17 ft high, yet will maintain tolerances to a thousandth over the 84-in. dia ballrace surface for the Bulldog. The first boring mill is now in use and tanks were delivered to the Army three months ahead of schedule.

Peek Around Corner

SPERRY GYRO protects aisle intersections, where high partitions limit the view, with mirrors 2 ft or more square hung at an angle from the ceiling. They give workers and truck drivers approaching the intersection a preview of the crossing, and avoid nasty collisions. No need to sneak up on a corner; trucks, messenger bikes, and other forms of wheeled transit can make time in the big one-floor plant that will be bigger as the United Nations moves out and into Manhattan.

News of Metalworking

McGraw Hill WORLD NEWS

PARTS STOCKPILED—A tremendous stockpiling program to accumulate one year's reserve of essential parts and accessories for trucks, autos, buses, tractors, locomotives and industrial machinery in general has been announced by the Banco do Brasil, Rio de Janeiro. Majority of imports under the new policy are likely to come from the U.S.

FORBID RE-EXPORT — American authorities have sent a note to the Egyptian government requesting them to forbid re-exportation of machinery bought from the U.S. The note points out that U.S. machinery is sent to Egypt as part of the technical aid program to underdeveloped countries. According to press reports, during the past two years more than one thousand tons of machinery necessary for Egypt's various industries have been re-exported to eastern Mediterranean countries without the knowledge of Egyptian authorities.

NEW HYDRAULIC JACK—A new aircraft jack has been developed by a Dutch factory at Weert. It is of hydraulic type, is easily transportable, and has considerable lifting power. Jacking can be effected with greatest accuracy according to a measurement scale, and completely horizontal lifting can be done without external control. The jack has an automatic security system.

GERMAN RESEARCH APPROVED — The western allies have told West Germany she could conduct research into certain types of atomic and jet physics. German scientists are now allowed to experiment in separation of isotopes and to build heavy gas-turbines for locomotives, or fixed turbines for power production. A special authorization for research is needed.

RAIL EQUIPMENT ORDERED — Orders have been placed in the U.S. for 1600 new freight cars and 32 diesel engines for the Mexican National Railways, with delivery to begin in June. The equipment is to be bought with some of the $60 million borrowed from the Export-Import Bank by Mexico last year.

New DO-75 to Help Machine

WASHINGTON — NPA officials have put into effect a stop-gap scheme they hope will help machine tool and machinery production until materials allocation under a Controlled Material Plan (CMP) takes effect.

The so-called "interim action"—spelled out as "Order M-61"—gives producers immediate authority to use a new DO number (DO-75) for supplies and components to be delivered during the third quarter.

The object according to the order: to provide "necessary materials and parts . . . for use in the manufacture of machine tools and related equipment so as to provide for increased production thereof during the third quarter of 1951, or until the NPA Controlled Materials Plan shall be effective . . ."

• **As a limitation** on the use of the DO-75 rating, NPA specified maximum amounts of iron and steel, copper, and aluminum products that producers of 30 categories of machinery will be able to procure during the 3rd quarter under the terms of the order.

BOX SCORE ON MATERIALS

ALUMINUM: For May and June you are limited (in manufacture of some 200 consumer items) to 50% of aluminum used in average month of the base period (first six months of 1950). Manufacturers of certain types of prime aluminum windows and frames permitted during May and June to use 65% of their monthly average consumption. Use of aluminum for MRO supplies is limited to same amount used in base period. Working inventory permitted: 60-day supply. (M-7, as amended Apr. 20, 1951.)

CADMIUM: Use restricted to certain essential items, such as anchorage of punch press dies, bearings for rolling mills, threaded parts for use in aircraft, various alloys, and parts subjected to heavy corrosion. Inventory limit: 30-day supply.

COLUMBIUM AND TANTALUM: Anyone using or holding more than 10 lb of contained columbium or tantalum in any month must file a report of inventory and consumption. Inventory limitation: 45-day supply. (M-49, as amended Apr. 26). NPA order M-3, as amended Mar. 15, limits use of columbium and tantalum bearing steels to DO rated orders. Amount of columbium or columbium-tantalum in steel is limited to ratio of eight parts to one part of carbon, except where higher ratio is specified for certain approved DO's.

COPPER: Production of brass mill and copper wire mill products limited to 80% of average quarterly output during base period. One month's output is limited to 40% of the permitted quarterly production. Quarterly output of foundry products limited to 100% of production in base period. Use of copper forms and products limited to 75% of average quarterly use in base period. Inventory limitations: 45-day supply for producers, 60-day supply for users, or for MRO supplies. (M-12, as amended Apr. 1.)

IRON AND STEEL: Use in consumer durable goods is limited to 80% of average quarterly use during base period. Use of steel in passenger automobiles and station wagons is limited to 75% of amount used in base period. (Amendment of May 4). In any one month, not more than 40% of permitted quarterly amount may be used. No limitation on use of steel for replacement parts. Not more than 40% of amount assembled in base period can be assembled in second quarter of 1951. (Applies to assemblers only, not manufacturers). Firms that used not more than 100 tons of iron or steel per quarter in the base period can use an equal amount in second quarter, 1951. (M-47, as amended Apr. 4.)

MOLYBDENUM: Deliveries are permitted without NPA authority to anyone whose total receipts during current months are not more than 200 lb, except for molybdenum metal powder, wire, rod or sheet, which are subject to full allocation. Inventory limitations: 60 days' requirements for powder, wire, rod or sheet; 45 days' requirements on all other forms of molybdenum. (M-33, as amended Mar. 27.) NPA order M-52, (Mar. 31) limits to 2.5% the molybdenum content of stainless steel.

LEAD: Consumers of lead are limited to 100% of their rate of use of the metal during base period. Inventory permitted: 30 days' supply. (M-38, amended Apr. 3.)

NICKEL: Use of nickel-bearing stainless steel, high nickel alloy, and nickel plating may not be used in a long list of items, under NPA order M-14. Consumption of primary nickel for non-rated orders is limited to 65% of average quarterly use during base period. Inventory limitation: 30 days' supply. (M-14, amended Mar. 31.)

TIN: May not be used for ornamental decorative purposes. Tin plate and terneplate manufacturers may use in second quarter 1951 not more than 95% of that used in their monthly base period. All other users of pig tin are permitted in second quarter 90% of their monthly base period usage. Inventory limitations: pig tin, 120 days' supply for tin plate manufacture, 60 days for any other purpose; 60 days for copper-base alloys, solder, babbitt, and other alloys containing 1.5% or more tin, and all other materials containing tin. (M-8, as amended Apr. 2.)

Tool Output

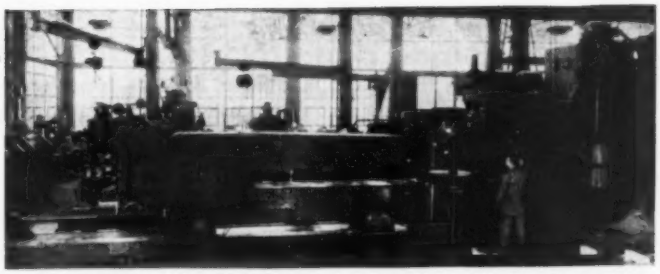
These percentages—all based on use during the first quarter of this year—range from 90% for aluminum products for certain kinds of equipment, up to 140% of base period consumption for iron and steel products. (See table below.)

This new procedure was devised to bridge the gap between the breakdown of the pooled order scheme as a method for handling the industry and the arrival of an effective materials allocation system under CMP. NPA officials are getting CMP off to a lumbering start beginning July 1, but they recognize that the machine tool allocation and production program should have been underway long before this.

Actually, there's much doubt about this new NPA order. If it's 100% effective, it is supposed to deliver to the machine builders about all the materials and components they have to order now for consumption during the third quarter. But there's widespread doubt that any new DO priority, thrown into the already-creaking priority system, can be much more than a gesture.

• **There's one gimmick** in the order, though that can be used to make the M-61 order more than the hunting license that other DO's have become. Sec. 8 of the order says: ". . . any person who is unable to place an order rated under the provisions of this order should apply to the National Production Authority, Ref. M-61. The National Production Authority will arrange to assist him in locating sources of supply."

Under its general allocation authority, NPA has been using "Directives" to allocate specific quantities of specified materials and components to companies that needed them. The directives usually take precedence, by their own terms, over other DO-priority orders. With this kind of backup from NPA officials, the M-61 order could "deliver the goods" the machinery producers are allowed to use under the new order. Privately, though, officials say, "if the machine builders get the amounts of materials they're entitled to under this order, they'll be lucky, and we'll be surprised."



FRENCH MUNITIONS MAKER Usines Schneider Greusot will use this Kling No. 100 rotary shear in fabrication of items employing heavy plate. The machine is the largest assembly of its kind ever made. It was machined and assembled completely in the plant of Kling Bros. Engineering Works, Chicago. Total weight is about 55,000 lb. The machine can shear plate up to one inch thick. Clamping attachment permits cutting and flanging of circles up to 17-ft dia. It was sold to the French firm through Simmons Machine Tool Corp.

Used Tool Order Outlined

WASHINGTON—Key features of a new ceiling price regulation for used machine tools, outlined by OPS at a meeting May 17 with a Used Machine Tools Advisory Committee, are:

1. Machine tools will be sold on a weight basis, and only with standard equipment or equipment originally sold as part of the machine.

2. Packaged (tie-in) sales are prohibited, and no dealer may lease a tool and then compel the lessor to purchase the machine at the ceiling price.

3. Used machine tools will be sold under three classifications—rebuilt, reconditioned, and as is—on a percentage of today's ceiling prices for comparable machines, and in four age groups: (a) built after Jan. 1, 1940; (b) after 1930; (c) after 1920; and (d) before Jan. 1, 1920.

Machinery Builders Can Obtain Materials According to Following Percentages of Amounts Used in First Six Months of 1950

	Iron & Steel Products	Copper Products	Aluminum Products
Boring and broaching machines	140	130	125
Drilling machines	140	130	125
Gear-cutting and finishing machines	140	130	125
Grinding and polishing machines	140	130	125
Lathes	140	130	125
Milling machines	140	130	125
Other machine tools, except home workshop	140	130	125
Rolling-mill machinery and equipment	140	130	125
Metalworking presses, except Forging	140	130	125
Metalworking machinery, N.E.C.	140	130	125
Jigs, fixtures, punches, dies, die sets and sub-presses	140	130	125
Precision measuring tools (including production gages)	140	130	125
Metalworking accessories, N.E.C.	140	130	125
Foundry machinery and equipment	115	110	105
Industrial pumps	100	95	90
Compressors	105	100	95
Industrial fans and blowers	100	95	90
Electric industrial furnaces and ovens	110	105	100
Fuel-fired industrial furnaces and ovens	110	105	100
Industrial furnace and oven parts and attachments	110	105	100
Compressors and compressor units, refrigeration and air-conditioning	110	105	100
Condensing units, refrigeration and air conditioning	110	105	100
Refrigeration and air-conditioning equipment, N.E.C. (except air conditioners, room)	110	105	100
Industrial patterns and molds	115	110	105
Electrical measuring instruments, N.E.C.	115	110	105
Integral horsepower motors and generators, under 2000 kw	110	105	100
Motor-generator sets and other rotating equipment	110	105	100
Industrial electrical control equipment, except railroad and automotive	115	110	105
Resistance welders, components and electrodes	105	100	95
High-frequency induction and dielectric heating apparatus	105	100	95

PLANT EXPANSION NEWS

• **Kaiser Aluminum & Chemical Corp.,** Oakland, Calif., will construct a new aluminum reduction plant at New Orleans, La. The entire project, including power facilities, will cost $79 million.

• **Woolridge Mfg. Co.,** Sunnyvale, Calif., is expanding its plant facilities to prepare for partial production of Mack off-highway vehicles, specifically designed to customer needs.

• **Metal Carbides Corp.,** Youngstown, Ohio, is adding 8000 sq ft to its manufacturing area. Expenditures include over $100,000 in new equipment.

• **Seidelhuber Steel Rolling Mill Corp.,** Seattle, Wash., plans to start construction of a steel rolling mill this summer. Productiion is expected late in 1952.

• **Commercial Shearing & Stamping Co.,** Youngstown, Ohio, have started the construction of a $750,000 fabricating plant in Salt Lake City.

• **Westinghouse Electric Corp.,** Pittsburgh, will expand its production capacity of giant electric generators by building two new structures on Braddock Ave., Pittsburgh. The 300,000 sq ft of additional space will be used for warehousing in addition to its manufacturing facilities.

• **Magnetic Metals Co.,** Camden, N. J., has completed expansion of its production capacities with the addition of 15,000 sq ft of floor space for fabricating magnetic core parts.

Cerium Solves Hot-Working Of Strategic Materials, Says Carpenter

READING, Pa.—High-alloy corrosion- and heat-resistant steels, among the most difficult of materials to work, can be hot-worked readily by addition of the rare-earth element, cerium, by a process developed by Carpenter Steel Co., and just patented (US Patent 2,553,330).

These steels can now be produced in bar, rod, sheet and tube forms without high wastage from cracking and tearing, and with higher hot hardness. Carpenter intends to license other steel producers to use the process, to increase mill yields from ingot to hot-rolled forms because of improved ductility. The element can be added to ferrous alloys containing nickel and one or more of the usual alloying elements. There is also the possibility of conserving strategic alloying materials.

Nickel content determines allowable ranges of cerium, an increased amount of nickel reducing the amount of cerium or its sister element, lanthanum, that can be added. Carpenter itself is producing several alloys containing the additive, including stainless AISI types 309, 310, 316, 317, and 330, as well as stainless 20, and austenitic valve steels. The material can also be added to non-ferrous alloys containing little or no iron.

Cerium and lanthanum are found in Florida, Idaho, California, India and Brazil, in misch metal. Cerium has heretofore been used extensively in "flints" for cigarette lighters.

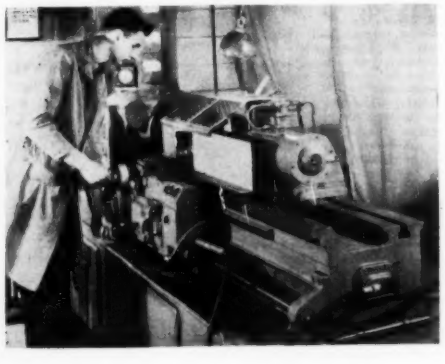
Study of Machine Tool Surplus Problem Urged

CHICAGO—A frank and complete study of the machine tool surplus problem growing out of the current defense tooling program should be started at once, Donald M. Pattison, vice president, Warner & Swasey Co. and chairman of committee on sales and service, National Machine Tool Builders' Association, said recently in a report to the membership.

The surplus problem probably will differ considerably from what it was in World War II. For one thing, it appears that only 40% or 50% as many machines will be delivered to contractors as in the 1941-1945 period. Many of these machines will go into defense plants which will be kept on a standby basis.

Mr. Pattison said that government and industry should take a lesson from the Janmat reserves and put all surplus machines into good operating condition at the end of the emergency and store them at suitable locations.

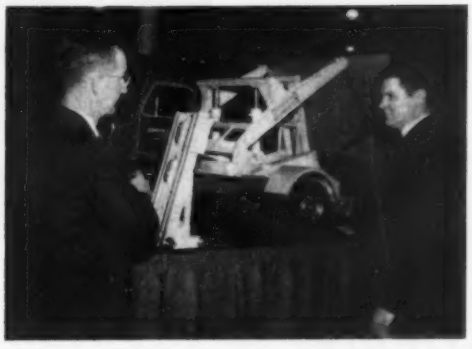
Bear in mind that the surplus problem can become a nightmare if not properly handled, Mr. Pattison warned. He cited the case of one builder who says that 30% of its machines now being delivered and on order will not be needed in peacetime by the customers for their normal peacetime products. If these machines were thrown on the market, as they were after World War II, the company would repeat its experience of competing against its own machines in the commercial market.



Specially equipped lathe was developed by Monarch Machine Tool Co., Sidney, Ohio, to facilitate study of metal-cutting problems, in a research program conducted by Curtiss Wright Corp., under Air Force contract. Monarch lathe shown simplified selection of wide variety of speeds and feeds required in making the tests. Spindle speed range of this 13-in. by 42-in. Mona-Matic machine was stepped up to 6000 rpm maximum through special gearing and use of a 20-hp variable speed drive. Tachometers are mounted on top of the headstock. A mechanical, two-component dynamometer attached to the cross slide measures both cutting and thrust forces created by the turning operation

More Scenes From the Materials Handling Show

ELECTRIC TILTING telescopic stacker is new unit in line of Clark Equipment Co. M. G. Peck, sales mgr, and G. L. Turner, chief engineer, Power Hand Trucks Div., explain features of 3000 lb, 24-in. centerline stacker to W. R. Hollinger, supt of production, Southern Alkali Co.



WORKING MODEL of Dempster Dumpster with LFW hoisting unit and 10 cu yd universal container for scrap, chips, trash, and production materials is examined by J. F. Olson, staff asst to works mgr, Saco-Lowell Shops. T. G. Shea, vice president, Dempster Bros., is at controls

SHIELDED POWER-BAR shown by Cleveland Crane & Engineering Co. provides greater safety for monorail installation. G. Schedler, Cleveland Tramrail, examines difference between open system (rear), and shielded bar (front). There's no interference with monorail operation

TURRET TUG is one of new line of HYSTER-Salzbury turret trucks. C. H. Collier of Hyster points out to William Wall, plant supt, R. G. LeTourneau, Inc., that small tractor is highly maneuverable, has automatic transmission, and can pull loads of 20,000 lb up to 8 mph

DIESEL-POWERED fork truck was exhibited for first time by Yale & Towne Mfg. Co. With truck are J. C. Hammelef, Chrysler Corp.; K. Nissley, Yale & Towne, Detroit; J. P. Kinney, gen sales mgr, and C. W. Williams, Chrysler. Truck is equipped with fluid transmission

REVOLVING side-loading attachment of Automatic Transportation Co. removes load without turning truck. D. Kirkpatrick shows L. V. Myers of Frigidaire Div., GMC, how fork carriage rotates at right angles to aisle, then scissors unit advances forks into pallet

Arnold K. Brown

Fred K. Powell, Jr.

Gerald J. McNerney

Alonzo G. Decker

Names in the News

Arnold K. Brown, formerly vice president and director of Brown & Sharpe Mfg. Co., Providence, R. I., has been named executive vice president and director of American Machine & Foundry Co., New York. He was until recently a member of the executive committee and vice president of Machinery & Allied Products Institute. **Fred K. Powell, Jr.,** formerly director of engineering, has been named vice president in charge of engineering. Other AMF changes: **Harry P. Sparkes,** director, Contract Div., and sales assistant to the president, named divisional vice president; **Daniel H. Haynes,** formerly vice president and treasurer, named vice chairman of the board and chairman of the executive committee; **David S. Meiklejohn,** elected treasurer; **E. J. Zimmer, Jr.,** manager, Contract Div., named assistant divisional vice president; **Rodney C. Cott,** formerly assistant to the president, in charge of commercial research and development, named vice president; **Maj. Gen. Russell L. Maxwell,** USA (ret.), vice president in charge of personnel, elected a director.

Dr. Charles A. Thomas has been elected president of Monsanto Chemical Co., St. Louis, Mo. He replaces **William M. Rand** who has retired. Dr. Thomas, formerly with General Motors, has been with Monsanto since 1936.

Fred M. Gillies, executive vice president of Acme Steel Co., Chicago, Ill. has been elected to the board of directors of the firm. **William C. Fork,** works manager of Acme Steel Co., has been elected vice president. He has been associated with the company since 1908.

Gerald J. McNerney has been named superintendent, Body Div., Studebaker Corp., South Bend, Ind. He has been in the division since 1922. Just before being named superintendent, Mr. McNerney was assistant to **Clarence H. Smith,** who left the position to become manager of the Studebaker aviation plant in Chicago.

W. F. Tuttle has been appointed chief engineer of Armco Steel Corp., Middletown, Ohio, succeeding **E. N. Millan** who will remain with the firm in an advisory capacity. Mr. Tuttle joined the company in 1922 and has been assistant chief engineer since 1945.

Robert T. Haslam has been elected to the board of directors of Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Haslam is a former vice president and director of Standard Oil Co. (New Jersey).

Jonathan N. Rawson has been appointed director of industrial activities for Brown & Sharpe Mfg. Co., Providence, R. I. He has been associated with the Brown & Sharpe organization since 1941.

Robert C. Becherer has been elected a vice president of Link-Belt Co., Chicago, Ill. Mr. Becherer has been with the firm since 1923 and has been general manager of the company's Ewart plant since 1947.

Robert J. Ryan has been elected to the position of president of the Nooter Corp., St. Louis, Mo. Mr. Ryan is a former executive vice president of the company and succeeds the late **Elmer J. Nooter** as president.

Alonzo G. Decker, a cofounder of Black & Decker Mfg. Co., Towson, Md., has been elected president to succeed the late **S. Duncan Black.** Mr. Decker has been vice president and general manager of the firm since he and Mr. Black started the company in 1910. **Robert D. Black** was advanced to vice president from vice president in charge of sales. **Glen H. Treslar,** vice president and sales manager, took over Mr. Black's former position.

G. K. Peets and **George W. Dieslinger** have been named to new positions by the Packard Motor Car Co., Detroit, Mich. Mr. Peets, Packard's chief inspector since 1940, will be factory manager in charge of all aircraft jet engine production. Mr. Dieslinger will be factory manager of Packard car and marine-diesel engine manufacturing.

L. D. Rigdon, formerly manager of the Headquarters Mfg. Div. has been named assistant to vice president in charge of manufacturing, Westinghouse Electric Corp., Pittsburgh. Joining Westinghouse in 1909, Mr. Rigdon has served largely in an executive capacity in connection with shop methods and equipment. **C. G. Wallis** has been named manager of the Headquarters Mfg. Div. to succeed Mr. Rigdon. Mr. Wallis formerly was director, Headquarters Mfg. Engineering Dept. **H. C. Coleman** has been named manager, Industry Engineering Dept., with headquarters at the East Pittsburgh divisions. He succeeds **F. R. Benedict,** recently assigned new duties with the Atomic Power Div. **S. A. Haverstick** succeeds Mr. Coleman as manager of the marine and aviation section, Industry Engineering Dept. **Clarence Lynn** has been named engineering manager, Atomic Power Div. He was manager of the DC Engineering Dept. of the Transportation & Generator Div.

H. R. Matheny

M. T. O'Donnell

William D. Gohr

Albert B. Diss

H. R. Matheny has been named vice president and general manager of the Highland Park Plant of Chrysler Corp., Detroit. **M. T. O'Donnell,** supervisor of central estimating for Chrysler since 1946, has been named general staff master mechanic to replace **Frank J. Morisette,** retired. Mr. Matheny first joined Chrysler in 1928, and was assigned the organization and overall direction of a parts division at the Dodge Main Plant. In 1932 he was named operating manager of Chrysler Motors Parts Corp. as well as factory manager of the Highland Park Plant. Four years later he also became vice president of the Parts Corp. and vice president and operating manager of the plant. Mr. O'Donnell joined Chrysler 15 years ago as a tool engineer at the DeSoto plant. In 1943 he was named assistant master mechanic of Chrysler's atomic bomb project. He became master mechanic a year later and then in 1945 became general superintendent, Cycleweld Div. In 1946 he was made supervisor of Central Estimating.

O. Wendell Macy has been named sales manager, Hydraulic Power Div., Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.

William D. Gohr, purchasing agent for Firestone Tire & Rubber Co., Akron, Ohio, has been named general manager of the company's Plant 3. He has been with the company since 1924.

Marvin L. Lee has been named as manager of operations of the aluminum extrusion plant at Halethorpe, Md., of Kaiser Aluminum & Chemical Corp.

Raymond H. Schaefer has been elected a vice president of American Brake Shoe Co., N. Y., N. Y. Mr. Schaefer has been director of research for the firm since 1947 and will continue in that capacity.

James V. Carmichael has been named general manager of the recently re-opened Marietta, Ga. division of Lockheed Aircraft Corp.

John T. Lancaster has joined Conner Tool & Cutter Co., Detroit, as works manager. Before joining Conner, Mr. Lancaster was mechanical superintendent for Richards-Wilcox Canadian Co., Ltd., London. In World War II he served as technical advisor, Ordnance Div., Otis-Fensom Elevator Co., Ltd., Hamilton, Ont.

Albert B. Diss has been named manager of manufacturing operations, Watson-Stillman Co., Roselle, N. J. He joined the firm in Nov., 1950, as assistant to the executive vice president. He had been associated with National Lead Co. and more recently with McKinsey & Co., New York. Mr. Diss will head all activities in the manufacturing, production, purchasing, and subcontracting departments.

Alan G. Binnie has been named vice president of Kollsman Instrument Corp., Elmhurst, N. Y., a subsidiary of Standard Coil Products Co., Inc. **Lowell H. Freye** was named treasurer, and **Arthur Richenthal,** secretary. Mr. Binnie has been assistant general manager at Kollsman for the past five years.

A. P. Fontaine has been elected a vice president and general manager of Consolidated Vultee Aircraft Corp. He has been associated with Republic Aircraft Corp., Fairchild Corp., Bendix Aviation Corp., and various divisions of Convair. Most recently, he was director, Aeronautical Research Center, University of Michigan.

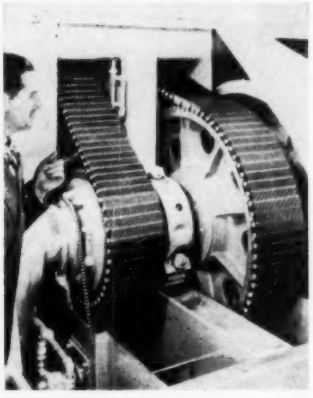
O. Wendell Macy

John T. Lancaster

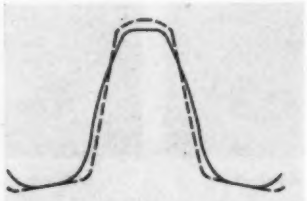
Alan G. Binnie

A. P. Fontaine

New Shop Equipment



These two 2-in. pitch, 12-in. wide Hy-Vo drives transmit 1500 hp at 600 rpm. Application is in draw-works for drilling 20,000-ft deep holes



SOLID LINE: HY-VO SPROCKET TOOTH
BROKEN LINE: SILENT CHAIN SPROCKET TOOTH

Sprockets for the Hy-Vo drive have teeth of involute design. Result is smoother engagement of chain and sprocket

Compensating rocker joint reduces wear in the joints. It also allows the chain to follow a tangential path to the sprocket pitch line

Chain Drives No Longer Chained By Speed Restrictions

Morse Hy-Vo makes possible single-drive units capable of transmitting as much as 5000 hp, at linear speeds up to 6500 fpm, or rotative speeds up to 3600 rpm. A Hy-Vo drive only 2 in. wide has transmitted as much as 500 hp. It is designed specifically for speed applications higher than conventional chain drives, and to replace unwieldy belt drives. A 6-in.-wide Hy-Vo drive, for example, will do the work of a 24-in. belt.

One of the results of this new drive will be the use of smaller and more inexpensive power plants. Such plants previously were ruled out because power-transmission equipment was not available to handle the speeds required to produce high hp in small engines.

One of the secrets of the drive's performance is a new chain-and-sprocket principle that virtually eliminates what is known as "chordal" or polygon action. The usual chain drive is subjected to it—a bumping, slapping, jerking action and vibration that eventually fatigues the chain and leads to drive failures.

Chordal action occurs because a sprocket acts like a polygon having a number of equal flat sides. The chain, in engaging a sprocket, rides alternately on the points and flats with the result that it "humps." In the Hy-Vo, the pitch of the chain gradually elongates as it articulates in engaging the sprocket. As a result, the point of tangency of the chain on the sprocket remains constant and there is no chordal action.

Other improvements include: adaptation of the involute tooth design to the sprockets; a balanced chain-link design with good stress distribution; an alloy-link and pin material which assures strength uniformity; and the use of several new metallurgical and manufacturing processes for improving resistance to fatigue.

The drive is said to be very quiet with full loads at any speed. Efficiency is said to be over 99.5%. At present, the drives are being produced in 1-, 1½-, and 2-in. pitches, in the most-demanded chain widths.

Morse Chain Co., 7601 Central Ave., Detroit 8, Mich.

Cro-Hone Wet Blaster Eliminates Centrifugal Pump

In most wet blasters, the mixture of abrasive and water is lifted to the gun by centrifugal pumping action. In this unit, maintenance and downtime is reduced by eliminating all moving parts.

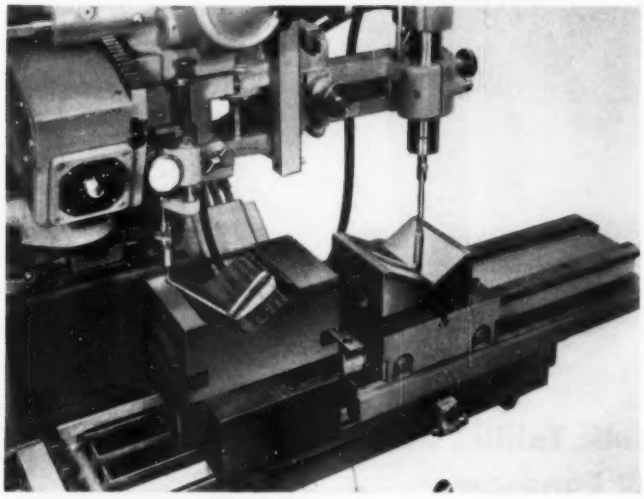
Conventional blasting speeds are said to have been trebled, and yet the unit operates at normal shop air pressures of from 80 to 120 psi. The power of the blast can be judged by the fact that a 3/16-in.-dia hole can be bored in a ½-in.-thick piece of plate glass in 38 sec.

The work is inserted into the 30x30-in. cabinet through the front hand holes or the side doors. Both entrances are fitted with splashproof guards. The valves and controls are located at the front of the cabinet and are actuated by the operator's knee. The window runs the full length of the cabinet.

The blaster is constructed of Type-304 stainless steel. Tubing is of copper and hoses of heavy-walled extruded vinyl.

The Cro-Plate Co., Inc., 747 Windsor St., Hartford 5, Conn.

Materials and Parts



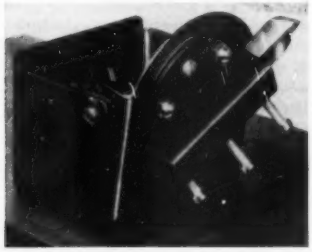
Reverse-Image Attachment for Die Milling Halves Masters Needed

This attachment is employed for milling right- or left-hand dies, molds, and hobs from masters of the opposite hand. Thus, with only one master, both right- and left-hand matching halves of a die can be milled to symmetry.

The attachment mounts on the machine table at the right-hand end, under the vertical depth-control unit. A rigid supporting base carries an auxiliary table on anti-friction rollers. At the rear of the attachment, a pair of matched racks, one on the supporting base and one on the auxiliary table, are engaged by a gear which is carried by a fixed bracket. The gear acts as an idler between the two racks, translating movement of the machine table to movement of the attachment table in the opposite direction. Therefore, a master shape mounted on the auxiliary table will be reproduced in the die block, but to the opposite hand.

The attachments are available for three Cincinnati milling machines: 8x18 in. tool and die miller, and the 16- and 28-in. vertical Hydro-Tels. All sizes of the attachment function in the same manner.

The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



Tool Holder for Power Grinding

The Accrangle attachment makes possible the grinding of both rake and clearance angles on any single-point tool up to ½ in. without removing the tool from the holder. The tools are put in the holder, the set screws tightened, and the instrument adjusted for the desired angle. Tools with the same angles can be ground consecutively without adjustment.

Carl Nomann Co., Los Angeles, Calif.

... INCLUDING

Twin-columned drilling machine reduces effects of tool thrust, can do many jobs ..... page 144

Induction forge heater has 30 interchangeable heating units for different size bars ..... page 144

Hydraulic table with 36-in. stroke handles heavy work in big band-saw machines ..... page 145

Centerless grinder requires little floor space and is designed for medium-sized work ..... page 146

Drop hammer has safety rest on left frame to hold the ram when wiping the top die ..... page 148

Limit switch controls solenoid-operated valves used in air and hydraulic circuits ..... page 150

Boring mill, said to be the largest ever built in the U. S., has 16 mechanical feeds ..... page 152

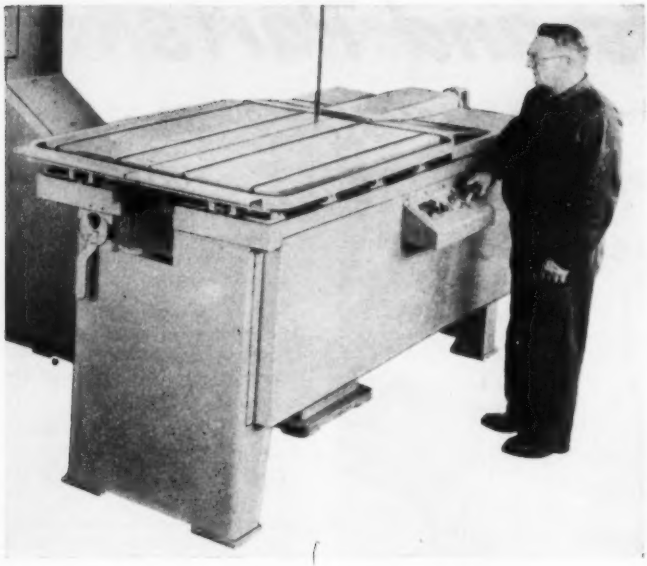
Direct-reading spectrometer speeds metal analysis by measuring as many as 20 elements s multaneously ..... page 156

Gears with 20° pressure angle save 20% in space, weight over the usual 14½° gears page 160

... and in June 11

Open-end beam punch uses 5 die blocks to handle up to 30-in. I-beams. Rating is 118 tons.

Scoring and wear of bearing slides and consequent loss of accuracy has been licked in milling machines by phenolic plates.



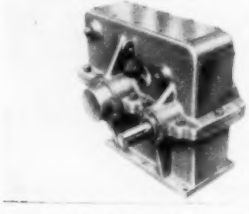
36-in.-Stroke Hydraulic Table Mounts on Any Doall Bandsaw

Accessory table mounts on any Doall machine to adopt it to handle heavy work such as large die blocks, castings, or forgings. It is said to be especially useful when sawing for inspection, as the work is cut automatically with a finish that is suitable for making porosity tests.

The table shown is used on a 60-in. throat, 40-in. work height Model V-60 Doall machine. It has a 40x48-in. working surface and a carriage bed 87x36 in. which will support a load of 3000 lb. The table has 4 T-slots for installing clamps, vises, etc.

Hydraulic system consists of a 5-gal. reservoir with filler opening and clean-out plate and a 2-gpm gear-type hydraulic pump driven by a ¾-hp motor. The circuit has an adjustable relief valve to limit working pressure to approx. 200 psi. A filter is attached to the suction line of the pump. Controls, governing rate of table feed up to 18 fpm and reversing rate of 36 fpm, are located on a panel mounted on the carriage bed.

The Doall Co., Des Plaines, Ill.



Automatic Mechanical Brake Controls Lowering on Cranes

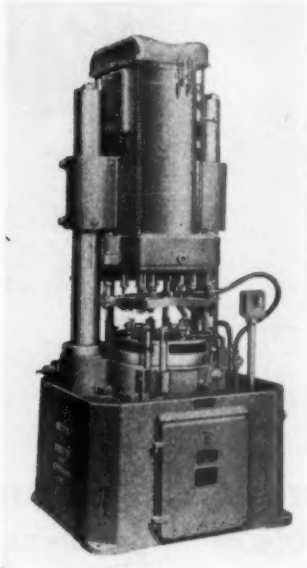
With this brake, suspended loads will not overhaul the hoist motor and drop at a dangerous rate of speed. Any position can be held independently of any other brake in the hoist system. For instance, the crane motor may be removed with a full load hanging from the boom end.

The load is kept from lowering or running down by two pawls in contact with a ratchet wheel. The weight of the load acting through a helix produces an axial thrust which clamps the ratchet wheel between two friction disks. The disks maintain sufficient pressure to prevent all rotation. By operating the motor in the lowering direction, the pressure on the helix is relieved and the brake opens, allowing the load to lower.

The opening of the brake is in direct proportion to the load, and just sufficient to permit the load to lower under direct control of the motor and at motor speed. When the hoist is operated in the upward direction the pawls lift clear of the ratchet wheel by means of friction plugs.

The brakes are built into the output shaft of a gear-reduction unit. The standard reduction ratio is 5 to 1.

Downs Crane and Hoist Co., Los Angeles, Calif.



Twin-Columned Driller Reduces Effects of Tool Thrust

The twin-column design ensures that the thrust from the tools is much nearer the point of support than on the conventional drilling machine. Another feature of these Adcock & Shipley (British) machines is that they can be used for a number of different jobs. What work they will do depends upon the type of fixtures fitted to the indexing table, the type of multihead fitted to the drillhead, and the design of the barrel cam used in the drillhead.

An example is the operations performed on a second-speed gear used in autos. The machine was equipped with a 6-station, hand-indexing table at which the following was carried out: 1st station, load and unload; 2nd, rough end mill two 0.385-in.-dia. radii; 3rd, finish end mill the preceding radii; 4th, drill two 39/64-in. holes; 5th, ream two ⅝-in. holes; 6th, chamfer the two ⅝-in. holes.

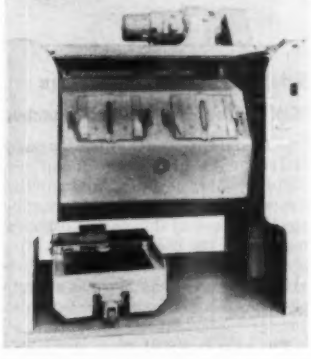
A cabinet base contains the indexing mechanism for the fixture-carrying table. Two ground steel columns

for carrying the head are fixed by means of flanges to the base. Vertical movement of the head is controlled by the columns.

The head is driven by a foot-mounted motor through V-belts to the main spindle, and by suitable gearing to the feed mechanism. The feed is operated automatically by the barrel cam, which gives quick approach, change to cut feed, and rapid return to the drillhead through a fixed roller. The head is totally enclosed and self lubricating.

The indexing table is normally operated by a Geneva movement which has a speedup arrangement to shorten the indexing cycle. If automatic indexing is not worthwhile due to the method or rate of production, a hand indexing model is available. Accurate location of the table is provided by a tapered plunger. It is interlocked so that it must be completely home before the head begins to feed down. The largest of 4 models has: 20-hp motors, 22-in.-dia table, and 6-in.-dia. columns.

Air Transport Equipment, Inc., 170 Old Country Rd., Mineola, N. Y.

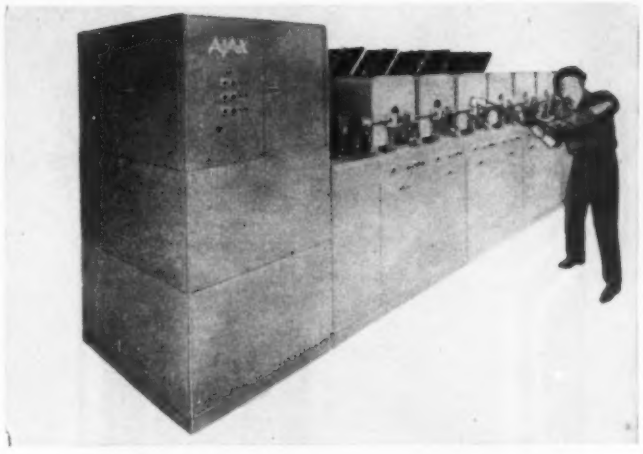


Tumble Finishing Machines Provide Variable Speed, Timer Control

Variable-speed drive gives the operator a wide choice of speeds for the deburring of steel, die cast, or other metal parts. An automatic timer control avoids the over or under-running of work during the processing period.

The "Buffer Strip" lining used in these machines makes possible quick replacement—thus keeping at a minimum downtime for renewal. Semi-soft rubber linings are also available. Other features include lightweight doors and a door plate that makes replacement of the door gasket easy.

Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago 18, Ill.



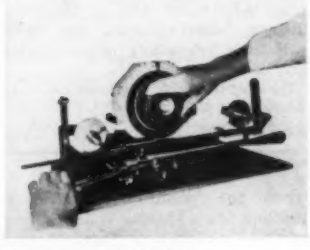
30 Interchangeable Heating Units In Induction Forge Heater

These units have space for 8 heating stations with 30 interchangeable heating units to accommodate different sizes of bars. Each station has its own transformer, capacitors, push buttons, signal lights, automatic timers, hydraulically operated billet-feeding devices, and protective relays. Despite this, they can be arranged to work together in a wide variety of combinations.

Three of these units, each with a power range of from 50 to 1500 kw, 400/800 v, and 3000 cycles are now in use heating steel bar stock for automotive forgings. Billet sizes from 1 to 4 in., either rounds or squares, can be handled. They are heated to 2250 F at a maximum rate of 7500 to 8500 lb per hour.

A feature is that each heater station comprises two coils in series. They may be operated to eject heated bars automatically or the back heater may be deenergized and the front heater used for bar-end heating. In this case, signal lights are arranged to advise the operator when to remove the bar manually.

Ajax Electrothermic Corp., Trenton, N. J.



Hot-Stamping Machine Embosses Individual Letters

The die wheel on this machine is enclosed in rock-asbestos insulation except for the bottom section where the hot stamping is done. It carries 40 interchangeable and replaceable characters (26 letters, 10 numbers, and 4 punctuation marks). Embossing in color is done by a roll-leaf transfer tape.

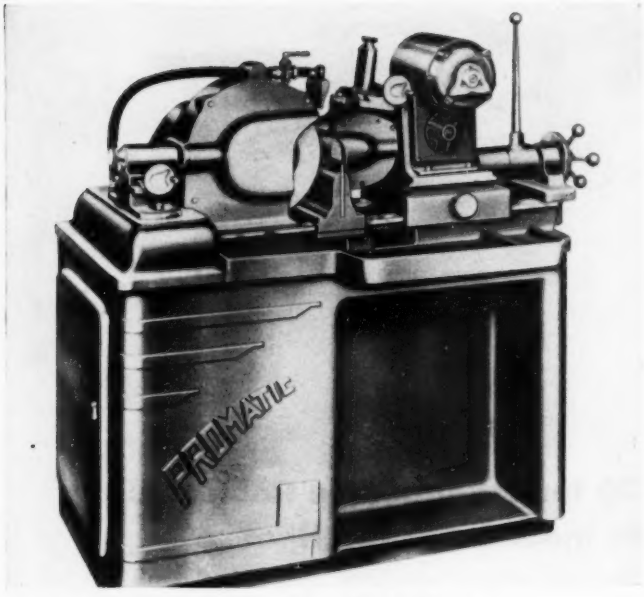
An insulated handwheel or turning knob rotates the die wheel with selection of characters read off from an index.

Heat for the die head is provided by ring-shaped heating elements that plug into 110/200-v, ac electric-light plugs.

Operation: The stamping head revolves in one position with the double-slide worktable moving from left to right, inward and outward so that the work is brought into stamping position and lifted against the die. An automatic advance slides the feed table forward at each swing of the screw-pressure lever, providing automatic spacing of the characters.

Dies sizes range from 1/16- to 3/16-in. characters in the Model 1H, with sizes up to ⅜ in. in the Model 7H. Among the many materials the machine will mark are thermoplastics.

The Acromark Co., 7-13 Morell St., Elizabeth 4, N. J.



Compact Centerless Grinder Meets Needs for Medium-Size Work

Capacity	1¼ in. dia
Grinding wheel	14 in. dia, 4 in. face
Regulating wheel	7 in. dia, 4 in. face
Main spindle speed	1600 rpm
Grinding-wheel motor	2 hp, 1800 rpm

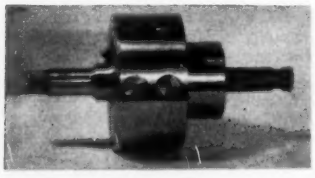
The Promatic No. 1 centerless grinder is said to meet the demand for a machine that requires small floor space, turns out a superior finish, and yet is low in cost.

Construction: all castings are normalized and made of semi-steel with high nickel content. Spindle castings are of large size to give greater rigidity. Alloy-steel spindles are mounted in pre-loaded anti-friction bearings.

The regulating wheel has a variable-speed drive to give instant selection of speeds ranging from 35 to 350 rpm. Setting of the regulating wheel is accomplished by a micrometer dial graduated in 0.0001 in. Diamond wheel truers have micrometer controls. Both wheels can be contour dressed from a single templet.

Standard equipment includes: Built-in coolant reservoir with removable settling basin; coolant pump with ¼-hp motor and all necessary fittings; wheel guards; and ¼-hp vari-drive regulating wheel motor and controls.

Diversified Metal Products Co., 5125 Alcoa Ave., Los Angeles 58, Calif.



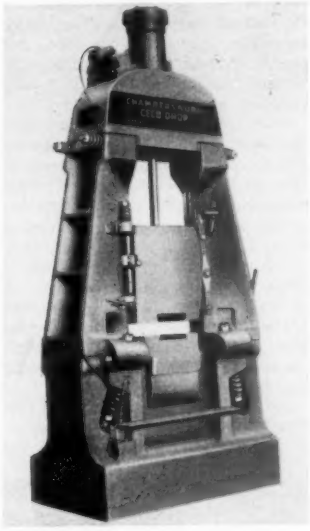
Nut-Runner Unit With Automatic Torque Control

This device used in nut running maintains a desired torque during driving and completely disengages when the required tightness is reached. In addition, it is claimed the tool will not overheat at high speed and heavy load. It does not have to be reset between operations.

Balls push against actuating pins which lock the springs in a compressed position, preventing the unit from overheating. There is no friction clutch which might slip when not desired. The tool is duo-directional; the torque settings are adjustable, and ball bearings are used.

The unit is equipped with a square end to fit Apex Tool Co. adapter. The driving end is made to fit any specification. Four models are available with in. lb of torque ranging from 4-25 to 200-1000. Diameters are 1⅝, 2½, 3½, and 3½ in.

Overload Control Co., 260-63 Langston Ave., Glen Oaks, L. I.



Safety Rest Holds Ram When Wiping Top Die in Drop Hammer

The Model-C Ceco-Drop is especially suited to the production of cutlery, hollow ware, jewelry, and similar items requiring short, snappy strokes. Work of this nature often requires the top die to be wiped after a certain number of strokes. To provide for this, the hammer has a safety rest on the left-hand frame which swings under the elevated ram.

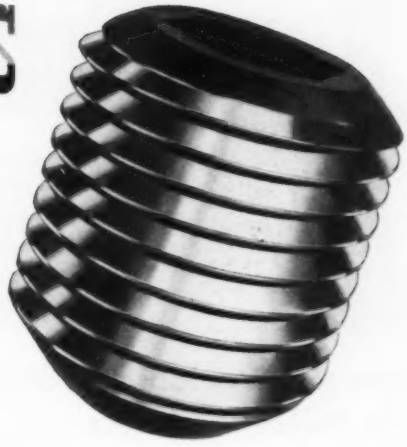
The ram is lifted by a piston and drops by gravity. A clamp holds the piston rod when not operating. When the operator steps on the treadle, an air valve releases the clamp and the rod rides freely. A safety cylinder keeps a cushion of air constantly above the piston.

The stroke is controlled by dogs mounted on a pivoted rocker which is in turn connected to the operating valve. A shock absorber connected to the rocker neutralizes shock and vibration. Changing from long to short stroke or vice-versa is accomplished through an air-operated dog controlled by a push-button on the treadle. Pressure on the button changes the stroke; release reverts to the standard stroke.

Chambersburg Engineering Co., Chambersburg, Pa.

OPERATION :

PROGRESS



Deep-grained in America's makeup is the restless urge to make that which is good—*better!* It is at the root of America's soaring output of the weapons of war. It is the hard core of our unmatched peacetime productivity.

Parker-Kalon's several contributions to "Operation PROGRESS" are notable. The story behind P-K* Ground Thread Socket Set Screws is a typical case in point.

For decades, everyone was satisfied with conventionally threaded screws. Then, engineers of the Parker-Kalon organization took a long, hard look—saw the possibility of applying thread-grinding to mass production of Socket Set Screws, something previously reserved only for screws of instrument precision produced without regard for high cost.

The result . . . P-K Ground Thread Set Screws . . . free of nicks, burrs and tool marks . . . every screw a dependable Class 3 Fit. You can *see* and feel the difference . . . see why they were quickly recognized as the best buy in Socket Set Screws.

P-K production continues 'round-the-clock to furnish the tremendous quantities wanted today for more fine products than ever before. For DO or other assemblies, set your standards by famous P-K quality. Parker-Kalon Corporation, 200 Varick Street, New York 14, N. Y.

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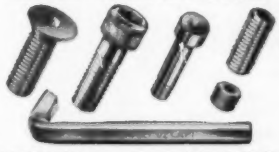
FOR ANY TYPE OF SOCKET SCREW
REMEMBER—IF IT'S P-K . . . IT'S O.K.®



Flat Head Socket Cap Screws • Size-marked Socket Head Cap Screws
Stripper Bolts • Ground Thread Socket Set Screws • Pipe Plugs • Hex Keys
Available Through Accredited Distributors.

PARKER-KALON*
cold-forged
SOCKET SCREWS

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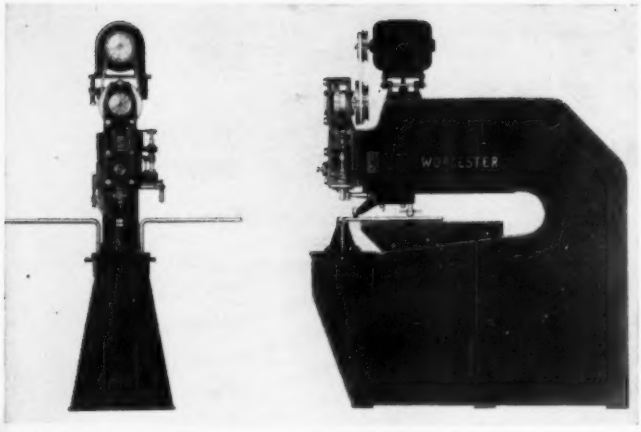


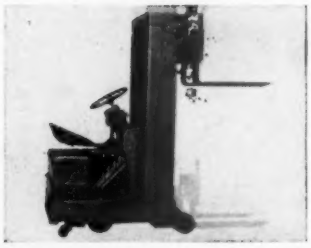
Nibbler Has Variable Stroke To Suit Metal Thickness

The Worcester nibbler employs all the desirable features of the German-made "Pels," with improvements that are said to make it an extremely efficient machine. Features are a 2-speed drive and a variable stroke that accommodates different thicknesses of metal.

Straight or contour cutting is done at a rate of 1200 strokes per minute. Rigidity is attained by a steel-frame construction. Two sizes are available: one to handle up to 3/16-in. low-carbon steel, the other for 5/16-in. carbon steel. Perfect circles can be cut.

Arduini Mfg. Corp., 435 Shrewsbury St., Worcester 4, Mass.

MACHINE FOR ASSEMBLING auto pistons and connecting rods, employs a new method to check the fit of the pins inserted. Using air as a feeler, the pins are pressed into position in the piston and rod. If the pressure required is too little the pin goes on through and is rejected, and the machine does not index. Another pin is inserted. If the pin is too tight there is not enough pressure to force it in place and again the machine does not index. By a process of selection such as this, uniformly good fits to tolerances allowed are attained. The machine also makes and inserts retaining rings.—*Trio Tool Co., Detroit, Mich.*



Maximum Counterbalance of Loads Achieved in Fork Trucks

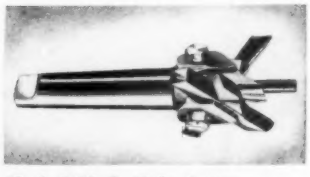
All weighty parts in this fork truck are placed as far to the rear as possible away from the front wheels (which act as the fulcrum). For example, the telescopic mast unit is placed behind the front wheels and not directly over them, as is common.

The unit is said to be the smallest standard fork truck on the market. The length of 55½ in. (exclusive of forks) makes it easy to maneuver in narrow aisles.

Another feature is the method of moving the forks and telescopic sections vertically. Four wheels are mounted on the fork carriage and 4 take the total thrust on the main frame. A series of hard steel rollers on a continuous chain revolve about a long equalizing member so that line contacts are multiplied where pressure occurs. Conventional arrangements use a single round wheel in each position with a single line contact.

Capacity is 2000 lb; maximum lift of forks is 126 in.; and full-load speed is 3 mph, no-load, 3½.

Market Forge Co., Everett, Mass.



Clark 3-Blade Hole Cutter

This adjustable hole cutter is said to work equally well on steel pipe, stainless steel, boiler plate, hard fiber Transite, and other materials.

The replaceable cutter blades are said to be easy to sharpen and easy to set. Body of the cutter is made of heat-treated steel. The HSS blades set 120° apart. Pilots are removable to permit the use of lead drills.

Holes that can be cut range from ⅝ to 5-in. diameters, and thicknesses from thin sheets to 1 in.

Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif.

Where did this car come from?

Most of us think that new cars come from big auto-making cities.

But the fact is, new automobiles are assembled in these cities—but their hundreds of parts come from every state in the union!

Bringing in these parts involves plenty of expert timing. A few missing pieces can slow up production seriously. A few missing doorhandles can stop an assembly line!

But the auto makers never let that line stop. They keep their cars rolling by using the speed of planes. They bring in needed parts by Air Express!

Today, with increased production for defense, Air Express speed helps keep the tanks and planes rolling, too. Whatever your business, here are the unique advantages you can enjoy with regular use of Air Express:

IT'S FASTEST — Air Express gives the fastest, most complete door-to-door pick up and delivery service in all cities and principal towns, *at no extra cost.*

IT'S MORE CONVENIENT—One call to Air Express Division of the Railway Express Agency arranges everything.

IT'S DEPENDABLE — Air Express provides one-carrier responsibility all the way and gets a *receipt upon delivery.*

IT'S PROFITABLE—Air Express expands profit-making opportunities in distribution and merchandising.

For more facts call Air Express Division of Railway Express Agency.

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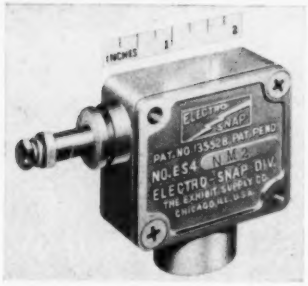
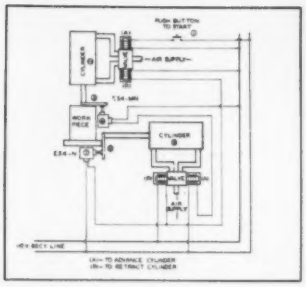




Limit Switches Control Solenoid-Operated Valves

This limit switch is especially designed for momentarily pulsed, solenoid-operated valves used in air and hydraulic circuits. Known as the ES4-NM series, the switches have a variety of "on" time lengths.

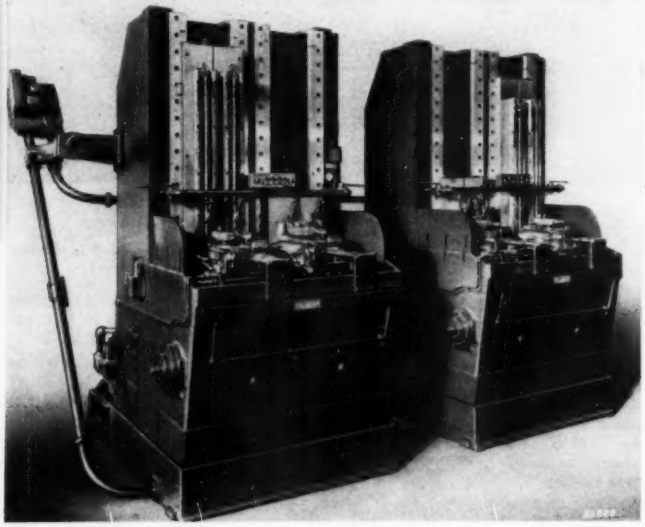
Depending on the speed of the actuating member, an "on" time can be selected that will give 1/10 to 2/10 second impulse to the valve. A slowly actuated switch, for example, need only be "on" for 1/16 in. of plunger travel. Faster switch actuation may require as much as 5/16 in. "on" period to furnish a 1/10 sec impulse.

Use of the switches eliminates the construction of one-way dogs. A simple flat dog can be attached to cylinder piston rods to actuate the limit switch.

An adjustable plunger head is possible by means of a built-in 10-32 screw that allows lengthening the plunger up to ½ in.

Diagram shows a method of sequencing 2 cylinders operated by momentarily pulsed solenoid valves. Note the ES4-NM switch for sequencing. The switches are furnished in 1/16-, 1/8-, and 3/16-in. standard lengths, "on" time lengths up to ⅜ in. on special order.

Electro-Snap Div., The Exhibit Supply Co., 4218-30 W. Lake St., Chicago.



HALF-ROUNDS and joint faces with tongues on truck-engine connecting rods and caps are finish broached on these twin machines. Rate is 760 (380 rods and 380 caps) per hour. Approx. 0.280 in. of stock is removed from each surface. All chips are removed from the bases with a Hapman rubber-flight conveyor powered by a ½-hp, 1750-rpm motor and reducer. The machines are the 50x66-in. stroke, double-slide units. — *The Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.*

Better Dovetail Support in Boring Head Increases Rigidity

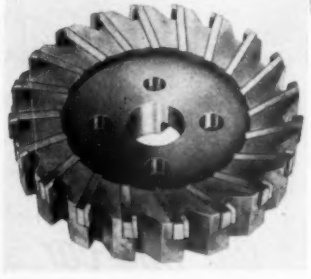
Featuring a more substantial body and block, the Series-50 boring head replaces the No. 5 while retaining its operating characteristics. Body width has been increased to augment rigidity, support the dovetail, and permit the tool to take heavier cuts at higher speeds. Both body and block are made of heat-treated alloy tool steel.

Both rough and finish operations on boring, milling, and drilling machines and automatics can be handled. Small and compact, the tool can be inserted easily and positioned rapidly.

The adjusting head is graduated in 50 divisions to provide readings in thousandths, and the tool body contains graduations to permit vernier readings of 0.0002 in. Constructed of tool steel, the adjusting screw is hardened before the threads are ground.

The head has a ⅜-in. capacity minimum with forged HSS bit and 7-in. capacity with alloy-steel bar with square bit, Shanks available for use with this model are 2, 3, and 4 Morse; 7, 9, and 10 Brown & Sharpe 1-in. straight; other sizes upon request.

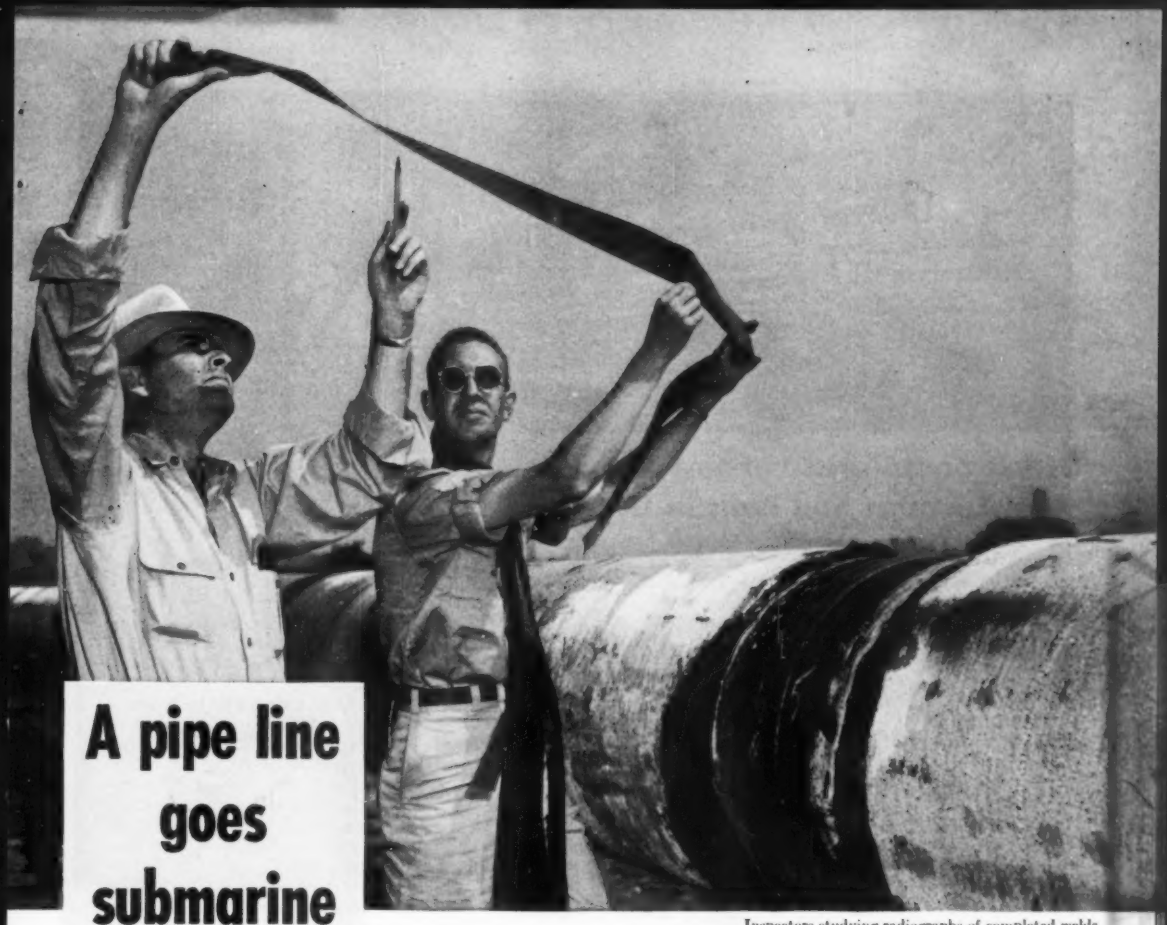
The Maxwell Co., 300 Broadway, Bedford, Ohio.



Removable-Insert Face Mill Has Fewer Parts, Heavier Body

A more rigid body, positive locking action, and heat-treated tool steel, carbide-tipped blades are some of the features of these face mills. It is recommended for cutting cast iron, steel, aluminum, brass, and bronze. It is claimed to produce a fine finish at high table feeds.

Nelco Tool Co., Manchester, Conn.



A pipe line goes submarine and Radiography proves each weld

Inspectors studying radiographs of completed welds in the 26-inch-diameter, 1⅛-inch-thick steel pipe.

NATURAL GAS from Texas makes its final plunge into New York City through a 4800-foot pipe line laid under the bed of the Hudson River. Each joint was welded. And with 450 lbs. p.s.i. inside and the pressure of silt and 90 feet of water outside, these welds had to be sound and set for a long life. To make sure, the contractor had radiographs made of every joint.

This is how Radiography helps do important jobs well. It puts a valuable O. K. on welds. It helps build reputations for consistently good work.

Wouldn't you like to know how it is helping to increase business and improve production for others? Your x-ray dealer will be glad to tell you. Get in touch with him.

EASTMAN KODAK COMPANY
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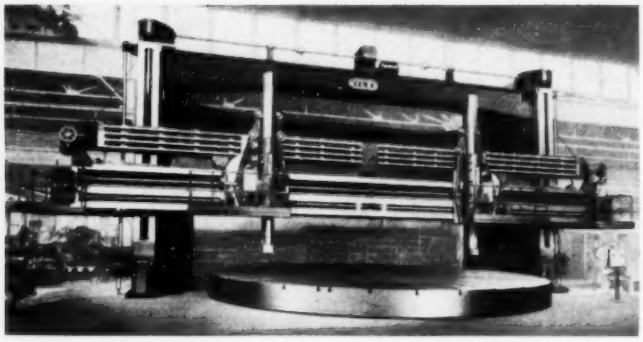


Niles Completes Largest Boring And Turning Mill Built in U. S.

The hugeness of this machine is evident from its specifications: Maximum swing of 43 ft 5 in., table 33 ft in dia, and a max. height under tools of 12 ft 2 in. Total height is 25 ft and weight 1,250,000 lb. It will be shipped to Italy where it will be used in turning parts for water-powered turbines and generators.

The table, which is 3 ft thick, was made in three sections to facilitate shipping. It is rotated by a 20° helical gear 24 ft in dia having 288 teeth. It was cast in halves and joined on the helical angle.

The table is driven through 2 pinions located 180° apart on the centerline that is parallel to the face of the crossrail. Two dc 50/75-hp motors power the table, balanced electrically to equalize the drive. One back gear is built into the drive mechanism from each motor, thus providing a table speed range of 0.125 to 5 rpm.

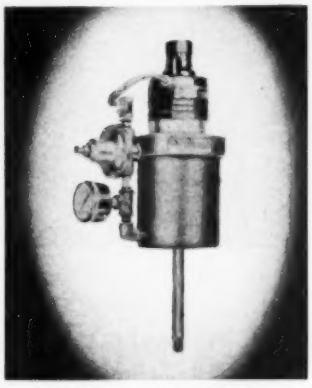
A 30-hp motor drives 4 vertical screws which elevate the crossrail. Right- and left-hand-swiveling rail heads are mounted on the face of the crossrail. They have forged-steel, octagonal-form boring bars measuring 12 in. across the flats. These bars slide on renewable bronze plates in the swings and have a travel of 9 ft.

Sixteen mechanical feeds are provided to the saddles along the crossrail or to the bars (vertically or at any angle up to 30° either side of vertical). Feeds range from 0.001 mm to 32 mm per table rev.

Power rapid traverse to each bar and saddle is provided by 10-hp motors on the rear of each crossrail end. Selection between bar and saddle, and between feed and rapid power traverse, is made by levers on the heads or at the crossrail ends.

Safety friction clutches in feed and traverse mechanism guard against breakage if heads are run together or bars are run against work.

Baldwin-Lima-Hamilton Corp., Hamilton, Ohio



Conoflow Pneumatic Cylinders Used in Throttling

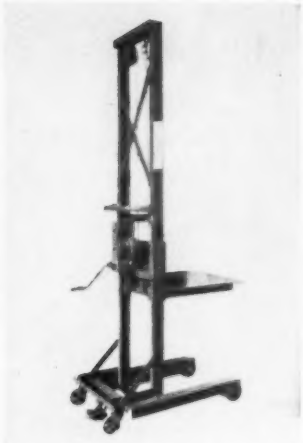
These cylinders are O-ring sealed and have a piston positioner integrally mounted in the head plate.

The one-piece piston is fitted with a graphite-impregnated O-ring. Head plate and piston stem are also O-ring sealed, eliminating head bolts and gland packing.

The positioner operates by means of a contact spring riding on the piston. The cylinders are claimed to be capable of repositioning accuracies to 1/500th of the total travel.

Known as the B-50 Series, the cylinders use air-supply pressures up to 100 psig. They are available in 4-, 6-, and 8-in. bores, strokes up to 4 in.

Conoflow Corp., 2100 Arch St., Philadelphia 3, Pa.



Barrett Portable Elevator Has 7-ft Lift

The "500" line of portable elevators has added a 7-ft lift model to their standard 5-ft group. Of 500-lb capacity, the unit increases the height to which materials can be piled; in keeping with the current trend to make more complete use of overhead space.

Applications include: stacking materials, serving storage racks, placing dies in machine, holding long or awkward work for machines, and overhead maintenance jobs.

Barret-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill.

Cleco Pneumatic Screwdriver Has Adjustable Clutch

An adjustable clutch is used on this screwdriver for the final tightening of the screws. It is operated by three fingers.

Known as the 9SPF-10B, the tool can be quickly converted to a nutrunner without the use of special tools. Fingers and bits can be changed without dismantling any part of the unit. A grip throttle controls speeds up to 1000 rpm.

Up to ¼-in. bolts and screws can be handled. It is 8¾-in. long and weighs 2¾ lb.

Cleco Div., Reed Roller Bit Co., Houston 1, Texas

CrysCoat

is in Good Company!

*Prepares Metal Surfaces for Painting

*Patented Material and Process

THE superiority of Square D's new line of safety switches is reflected in many finely designed features . . . modern styling, compactness, simple mechanism, silver-plated current-carrying parts. Nothing has been left to chance! Even the switch boxes have been Oakite *CrysCoat* processed to insure durable paint adhesion and resistance to corrosion.

The Oakite *CrysCoat* Process may be just what you're looking for. With minimum equipment . . . in minimum time . . . at minimum cost you can (1) clean metal surfaces and condition them for painting; (2) improve the adhesion of paint to metal; (3) prevent corrosion before metal is painted; (4) localize corrosion under paint if finish is broken.

The Oakite *CrysCoat* Process Offers These Extras:

1. **Eliminates operations . . . uses less equipment**
2. **Cuts operating time**
3. **Uses less chemicals for cleaning and conditioning**
4. **Reduces heating costs**
5. **Saves cost of expensive acid-proof tanks and equipment**
6. **Saves cost of frequent descaling and desludging**
7. **Drag-out costs are less because of low original cost of solution**
8. **Saves paint**
9. **Cuts cost of rejects caused by rusting before painting**

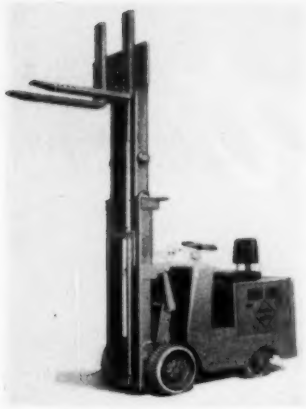
FREE . . . illustrated folder describes the Oakite *CrysCoat* Process for use in before-paint-treatment of steel, aluminum sheet and castings, zinc die castings and galvanized surfaces. If you are engaged in the fabrication of civilian goods or the speedy production of defense orders—send for Folder F7642.

OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in Principal Cities of U. S. & Canada

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE



Low-Pressure Hydraulic Hoist Put in Electric Fork Truck

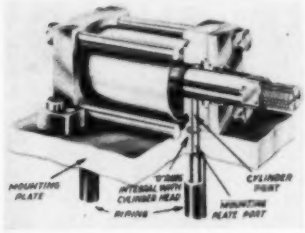
A single-cylinder, low-pressure, double-action hydraulic hoist has been installed in this battery truck. The mechanism has been simplified; there are fewer moving parts than in multiple chain-drive hoists, therefore maintenance costs are lower.

The hydraulic cylinder is centered in the hoist frames—giving increased visibility of load and travelway. The hydraulic pump for hoist and tilt is direct connected to an electric motor, independent of truck's travel motor.

The hoist frames are hot-pressed alloy-steel channels; the upper frame being equipped with sealed roller bearings instead of a sliding friction fit.

Over-all height of upright's when telescoped is 83 in.; fully extended, 145 in.; maximum lift of fork, 126 in. Over-all length of truck with 36-in. fork is 118 in.; width, 42½ in. Hoist speed for full load is 20 fpm going up; and 40 going down; without load 40 and 36, respectively. Travel speed with full load is 5 mph.

Elwell-Parker Electric Co., Cleveland, Ohio



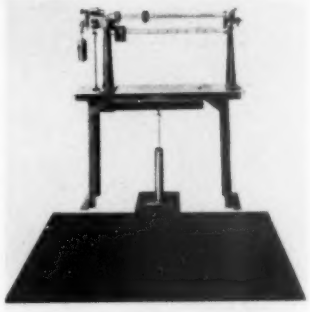
O-Ring Cylinder Mounting Saves Time, Space, and Piping

Air and hydraulic cylinders can be installed singly or in a side-by-side manifold arrangement without making the actual pipe connections to the cylinders. This is possible through an O-ring cylinder mounting made by Miller Motor Co.

The piping is directly connected to ports in a machined flat-surface mounting plate or manifold. The cylinders are in turn mounted on this plate with O-ring seals at the mating surface. The seals conform to J.I.C. Hydraulic Standards and are preassembled into the cylinder port, thus eliminating installing time. The mounting flanges of the cylinder are secured to the plate by ordinary bolts or screws. Removal of cylinders is accomplished without having to disconnect any piping.

Other advantages claimed for the mounting are: greater fluid flow because the O-ring ports are equivalent to a size larger than conventional ports; minimum pressure loss, and elimination of turbulence and aeration as sudden changes in cross-sectional areas of pipes and fittings are eliminated.

Miller Motor Co., 4027 N. Kedzie Ave., Chicago 18, Ill.



No Wood Used In Platform Beam Scale

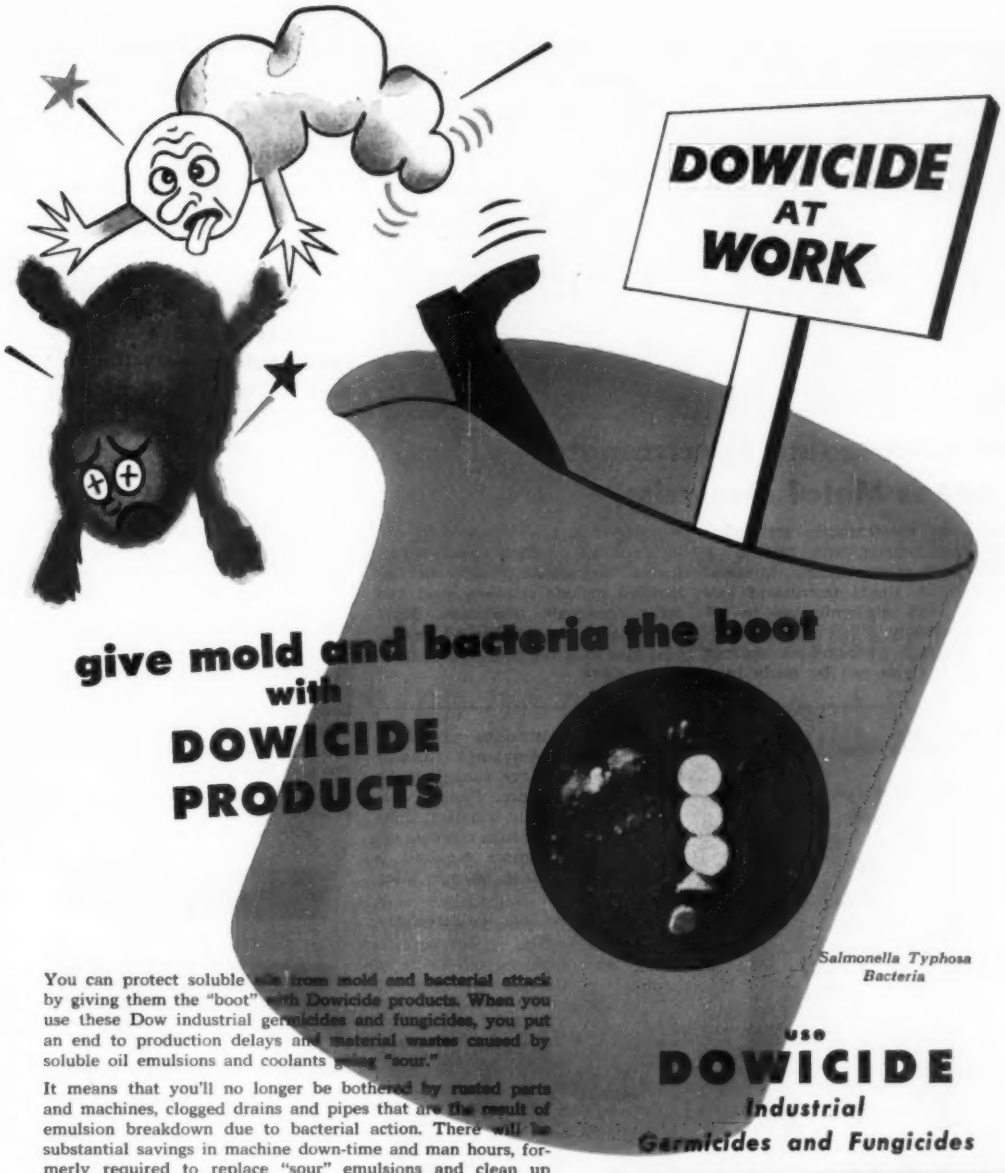
Called the Load King, this heavy duty scale is for applications where shock loading is the rule. The lever system in the platform is made of steel, as are other key parts. No wood is used.

Poises on the main bar can be rapidly positioned because of a roller bearing mounting. Other features include: end-loading platform that gives the same reading regardless of the location of the load on the platform. Outboard bearings mounted on the platform allows it to absorb the shock of moving loads without damage to the scale. It will not tip.

Pit requirements are only 11 in., saving money when installing the scale. Available in self-contained and semi-self-contained models and in capacities up to 6400 lb. Platforms range from 46x38 to 76x54 in.

The Yale & Towne Mfg. Co., Philadelphia Div., 11000 Roosevelt Blvd., Philadelphia 15, Pa.

ARTILLERY SHELLS can be grasped, lifted, and rotated by this attachment. Hydraulic clamp at end of 60-in. ram can handle 4- to 10-in.-dia cylinders weighing up to 500 lb. The 90° of rotation enable the shells to be placed in either a horizontal or vertical position. Attachment can be easily removed. *—Baker Industrial Truck Div., The Baker-Rauling Co., 1250 W. 80th St., Cleveland 2, Ohio.*



give mold and bacteria the boot with DOWICIDE PRODUCTS

Salmonella Typhosa Bacteria

You can protect soluble oils from mold and bacterial attack by giving them the "boot" with Dowicide products. When you use these Dow industrial germicides and fungicides, you put an end to production delays and material wastes caused by soluble oil emulsions and coolants going "sour."

It means that you'll no longer be bothered by rusted parts and machines, clogged drains and pipes that are the result of emulsion breakdown due to bacterial action. There will be substantial savings in machine down-time and man hours, formerly required to replace "sour" emulsions and clean up equipment. Add to these preventative features the plus factor of greater service life for your soluble oil emulsions and you will realize *it costs you money not to incorporate Dowicide* products in your soluble oil emulsions and coolants. Give mold and bacteria the "boot" today by putting these products to work in your plant.

Dow maintains complete laboratory facilities to help you solve your problems. Contact your nearest sales office or write direct to Midland.

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DOWICIDE
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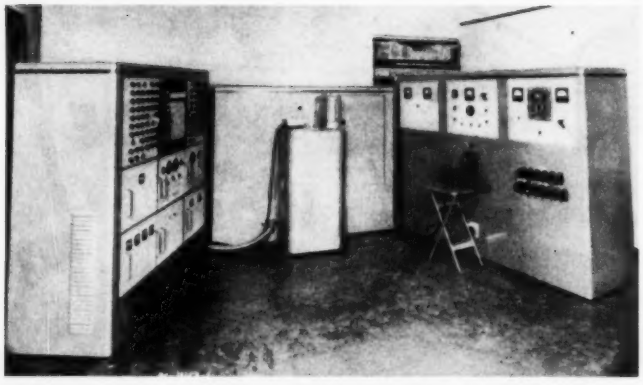


Direct-Reading Spectrometer Speeds Metal Analysis

Based on spectroscopic principles, the Quantometer can analize a variety of metals almost instantaneously. A single instrument can measure 25 elements—up to 20 simultaneously.

In addition, pen-and-ink records of the analysis can be made in 2 minutes or less. Multiple copies can be made for production-control purposes. The materials that can be handled include stainless steel and many inorganic substances. More than one kind of analysis can be run.

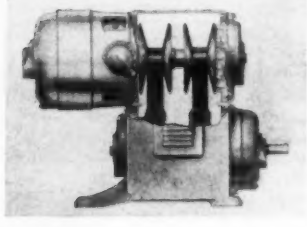
Applied Research Laboratories, Glendale 4, Calif.

Miller DC Arc Welder Can Operate by Remote Control

Selenium-rectifier dc welder is said to have all the advantages of ac. Made in two models, 40 to 250 amp and 60 to 375 amp, it has the following features: arc-start surge; current control for remote-control operation; no moving parts; instantaneous voltage recovery; and low starting current.

Lifting hooks on the side of the welder permit it to be moved by overhead hoist. Amperage indicator at the front is large enough to be seen from a distance. Remote current control is easily installed. Units can be paralleled if high currents are desired. Input power required is 220/400 volt, 3-phase, 60-cycle alternating current.

Miller Electric Mfg. Co., Appleton, Wis.



Variable-Speed Motors Have Dual Belts

To carry loads as high as 50 hp, these motors employ dual belts from the transmission. By thus distributing the load, undue strain is avoided. A calibrated spring counterbalances the belt load. It maintains pressure between the two halves of the driven disks and the side of the belt. This principle is said to avoid the disadvantages of variable center drives or extra flexing of belts over idlers. In addition, the spring takes up any slack due to stretch or wear of the belts.

Use of the belts does not affect ease of changing motor speeds, which is done by merely turning a control dial.

U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles 54, Calif.

Notched-Coil Rings Speed Brazing of Projectiles

Flat-wire rings for silver brazing projectiles and other ordnance equipment are being made in unlimited diameters and thicknesses. Forms available include butt, lap, and gap. Because they are stress relieved, the rings retain a tolerance of 0.001 in. and do not distort when heat is applied. The rings can be compressed into grooves in inner-diameter applications—when released they snap into place.

The dimensions of the rings are determined by the job, thus savings in material are effected since only the proper amount is put in the ring. Because of the notch, each ring can be snapped off individually from the coil. The rings are available in Sil-Fos and Easy-Flo wire.

Lucas-Milhaupt Engineering Co., 5051 S. Lake Drive, Cudahy, Wis.

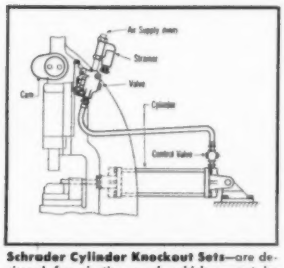
New Noses for Used Electrodes

The Nu-Tip process brazes a new nose onto a used spotwelding electrode shank. A special silver solder is employed which provides a bond of high melting point, high strength, and low electrical resistance. Loss of electrode hardness due to brazing is said to be held within a low limit.

It is reported that in comprehensive offset welding tests, the electrodes have run 30,000 welds and have withstood repeated applications of 2000 lb of force at an angle of 30°. The noses use a fluted water hole for more effective cooling.

P. R. Mallory & Co., Inc., Indianapolis, Ind.

Airways to Savings and Safety via Schrader®



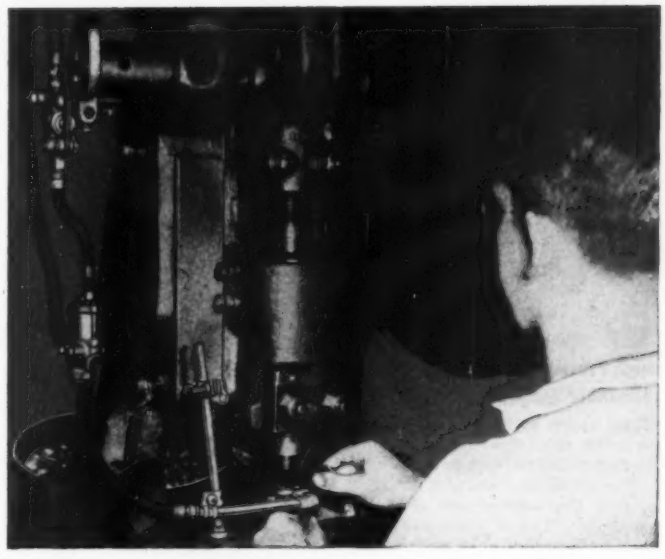
Schrader Cylinder Knockout Sets—are designed for ejecting work which cannot be blown from dies by an air blast. The cam can be adjusted to actuate the knockout cylinder at any point during the press cycle.

Schrader Power Press Controls—are one of the easiest ways to keep hands out of danger zones. Requires the use of two hands to operate the levers. Builds an operator-confidence that increases the flow of production.

Schrader Kick Press Controls—These controls substitute more efficient air power for foot power—thus eliminating fatigue, spoiled work. There is a Schrader control for hand operation, foot operation or both.

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

Schrader
PRODUCTS
CONTROL THE AIR



How Air Ejection of work can STEP UP Production and Safety

Hand removal of work is slow and dangerous. You can increase production as well as safety—right now—by installing Schrader Air Ejection Sets on your power press or on any other machine that has a moving member to actuate a cam or sliding tripper.

These Air Ejection Sets remove work from the die by an intermittent blast of air. Can be timed to deliver a blast from a fraction of a second to any desired length during or after the cycle. This method saves time and eliminates the hazards of hand removal.

Uses up to 90% less air. Schrader Air Ejection Sets cut down the wasteful flow of a steady air. In many cases air savings up to 90% have been effected by the adoption of Schrader Air Ejection Sets. Before you decide your compressors have reached their maximum capacity investigate how Schrader Controls cut down air waste.

Schrader Air Ejection Sets come assembled and ready to install. They are surprisingly inexpensive and pay for themselves in a matter of weeks.

If you have an ejection problem on any kind of machine, it can be solved easily by one of a number of combinations of cylinders and valves. So look over the machines in your shop. You'll see many places where these ejection sets are just the thing. Ask us to help you determine what will best fit your needs. Send us a letter outlining your particular installation, your idea, or fill out the coupon below.

Mail this Coupon Today

A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn, N. Y., Dept. F-2

Please send me further information on

☐ Air Ejection ☐ Cylinder Knockout Sets
☐ Power Press Controls ☐ Kick Press Controls

Name_____ Title_____

Company_____

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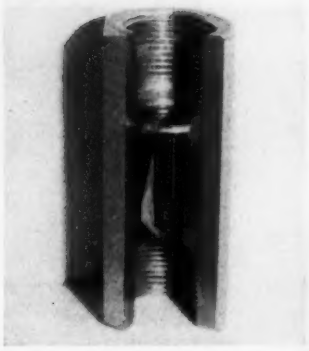


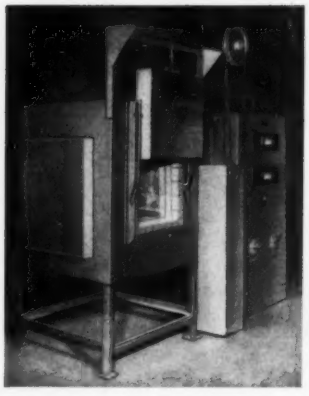
High-Pressure Check Valves Eliminate Surges

These check valves were developed to meet the requirements peculiar to high-pressure, high-flow circuits.

The principle feature of the valve is that the opening and closing is dampened. This is accomplished by guiding a poppet on a hollow shaft which contains a chamber for a dashpot and a return spring. A calibrated orifice connects from the chamber to the outside of the downstream side of the valve. In normal service the chamber is filled with hydraulic fluid through the orifice. Under rapid-flow conditions, the check poppet, in its opening motion, must displace the fluid trapped in the chamber through the calibrated orifice. In the reseating of the poppet the fluid evacuated from the chamber must be replenished through the calibrating orifice. The motion of the poppet is, therefore, snubbed in either direction, preventing shocks and hammer.

The check valve is satisfactory for systems operating at as high as 5000 psi. Sizes available are from ½ to 2 in. pipe.

Greer Hydraulics Inc., 452 18th St., Brooklyn, N. Y.



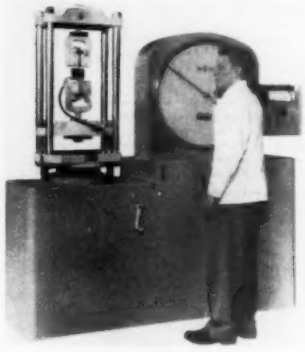
Pereco Heat-Treating Furnace Has High-Temp. Cutoff

The control panel on the Model FG-7800 electric furnace is equipped with a high-limit cutoff which acts to safeguard the unit from overheating. The panel is also equipped with a voltage-regulating, multi-tap transformer; temperature indicator and controller; and a magnetic contactor.

Large work chamber, and temperatures up to 2500 F with an absolute maximum of 2700 F are other features. Wedge-shaped door on chamber is equipped with chain hoist. The heavy steel, welded case is strongly reinforced. Globar silicon-carbide heating elements are employed.

Over-all size is 33¼ in. wide, 39¼ in. long, and 64 in. high; loading area is 18 wide, 24 long, and 18 high. Maximum connected load is 34.5 kw. Operating current is 220 v, 3 phase.

Pereny Equipment Co., 893 Chambers Rd., Columbus 12, Ohio



Olson Testing Machines Provide 50-to-1 Range Ratio

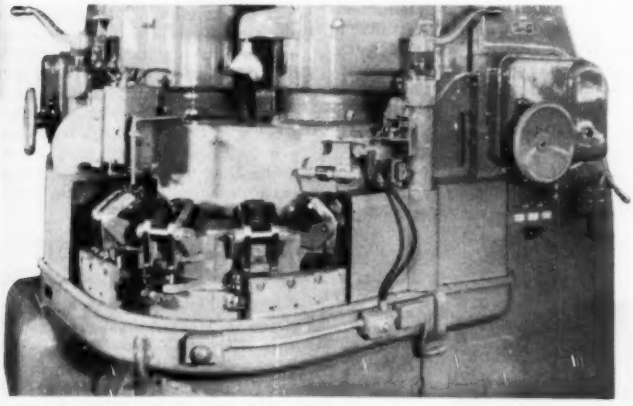
Designated the Super L, these machines have an indicating system which makes possible a 50-to-1 spread of testing ranges on one 28-in. dial. There are 3 ranges; full, 1/5, and 1/50 capacities; indicated in 3 different colors on the same dial. Since zero ranges of all loads are identical, ranges may be changed during a test without changing the rate of loading. Loading and indicating systems are separate—loading is developed hydraulically, but is measured and indicated electronically.

Load application is accomplished by a hydraulic piston and cylinder in the base. The need for rollers or guides is eliminated and the shock of breaking specimens is reduced.

Hydraulic safety valves and a stroke-limit switch prevent overloading and overtravel. Crossheads are supplied with either hand crank or motor drive. By using an electronic recorder, testing ranges may be increased to a ratio of 100 to 1.

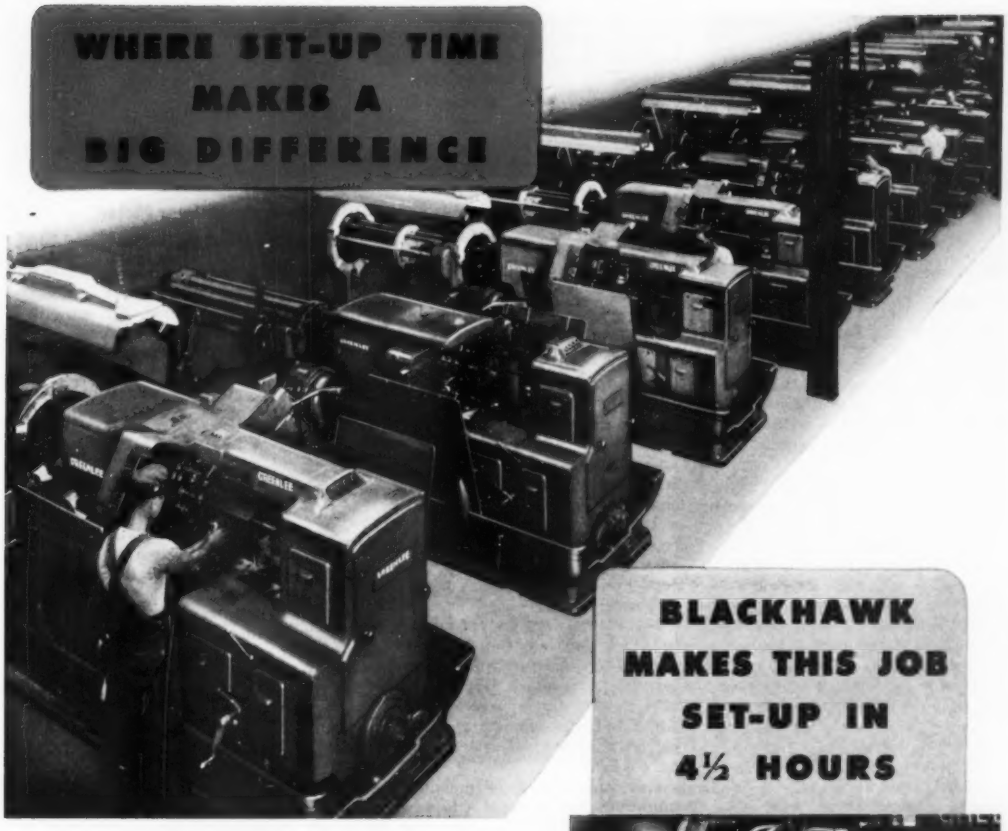
Capacities available are: 60,000, 120,000, 200,000, and 300,000 lb with suitable middle ranges and low ranges of 1200, 3000, 4000, and 6000 lb, respectively.

Tinius Olsen Testing Machine Co., 1006 Eastern Rd., Willow Grove, Pa.



ROTARY SURFACE GRINDER finishes the covers of automotive oil-pump bodies. Automatic clamping fixtures hold the work and automatic sizers keep the pieces within specified tolerances. A safety device stops the table in case the operator doesn't locate the work properly in the fixture. The machine is known as the Hanchett No. 24A2 grinder. — *Mattison Machine Works, Rockford, Ill.*

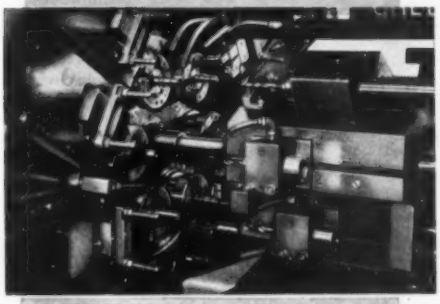
WHERE SET-UP TIME MAKES A BIG DIFFERENCE



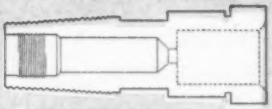
BLACKHAWK MAKES THIS JOB SET-UP IN 4½ HOURS

To be profitably accomplished, small-lot production on multiple-spindle screw machines requires a minimum of set-up time. Greenlee Automatics were especially designed for rapid machine changes to accommodate small-lot work.

The Blackhawk Mfg. Co., of Milwaukee, manufacturers of hydraulic jacks, bending equipment, tools, and fittings, find Greenlee Automatics well-suited for their critical production requirements. They like the Greenlee's easily-changed forming slide cams, rapid stroke-setting arrangement, and interchangeable tooling facilities, finding these and other features ideal for making profitable runs of 10,000 or more pieces. Properly-tooled Greenlee Automatics can solve your production problems, whether your job runs are large or small. Why not submit *part prints for cost-saving recommendations?*



SET-UP FOR "SPEE-D"* COUPLER PART
*T. M. Reg. U. S. Pat. Off.

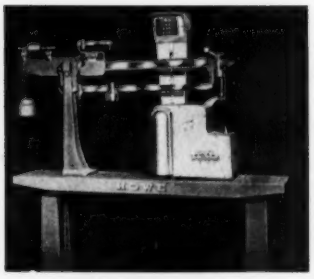


Twelve operations on this steel piece are performed in a cycle time of 21 seconds. Included are forming and shaving to close tolerances, facing, turning, and undercutting, accurate deep drilling, threading, and tapping. Set-up time is 4-1/2 hours. Only one tool change is needed on a 10,000 run.

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & COMPANY
1725 MASON AVENUE
ROCKFORD, ILLINOIS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES



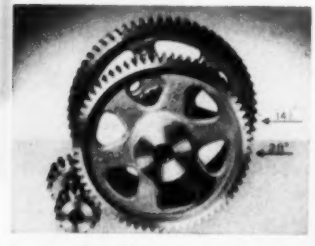
Automatic-Weighing Accessory Attaches to any Beam Scale

The Howe 77 Weightograph can be attached to any make of beam scale, or to any scale convertible to beam operation. It attaches to the beam shelf and is connected to the beam through a rod.

The upward pull of the connecting rod swings a chart in an arc between a stationary light and a magnifying lens. The figure and graduations on the chart are magnified to about 40 times their original size and reflected by means of mirrors to the mirror screen of a periscope. The periscope is at eye level and reading-line length is 180 in. An oil dashpot dampens the movement of the beam; bringing the image to a quick stop. The chart and pendulum shaft operate on ball bearings.

The light source is a prefocussed projection lamp which positions through a bayonet lock. A large condensing lens with heat filter intensifies the light.

The Howe Scale Co., Rutland, Vt.



Gears with 20° Pressure Angle Save 20% in Space, Weight

Boston Gear is producing spur and steel miter gears with 20° instead of the usual 14½° pressure angle. The increased angle permits a wider tooth base, stronger teeth, longer contact surface, larger tooth bearing surface, and smoother rolling action. The result is said to be a saving in hp—as much as 20% per hp delivered.

The 20° pressure angle also allows gears of a finer pitch to be employed for equal work. The resultant space and weight saving average 20%.

Boston Gear Works, 60 Hayward St., Quincy 71, Mass.

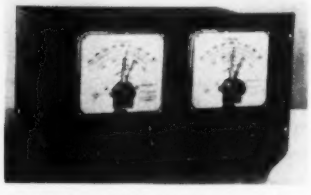
Metallizing Gun Sprays Zinc At Rates up to 80 lb per hr

Metal-spraying gun has a speed of up to 18 lb per hour for aluminum and nickel and up to 80 for zinc. It is especially designed for coating shafts, rolls, or machine parts from a lathe mounting. Its uses are in rebuilding worn parts, putting on corrosion-resistant coatings, and in reclaiming work that has been mismachined.

No. 15-B&S-gage wire of up to 3/16 in. dia is fed into the gun using a 1/20-hp constant-speed induction motor. The wire stock is atomized at 6300 F with an oxyacetylene torch. Air aids in the atomizing and then carries the spray to the surface to be coated.

Gas and air requirements are minimum. For example, when spraying 3/16 stainless, the gun uses 44 cu ft of acetylene and 68 cu ft of oxygen per hr. The atomizing-air requirements would be 16 cfm at 45 lb pressure. Weight of the gun is 20 lb.

Metallizing Company of America, 3520 W. Carrol Ave., Chicago 24, Ill.



AUTOMATIC PYROMETER control regulates the temperature of dimpling dies used in aircraft structures. The unit includes two double-contact meter-relays, one for each section of the die. Each meter has an on and off contact for regulating the heat of the die and a low-limit contact for safety shutoff. Temperature range is from 350 to 750 F. ***—Assembly Products, Inc., Chagrin Falls, O.***

Totally Enclosed Gear Motor Has Motor-Mounted Brake

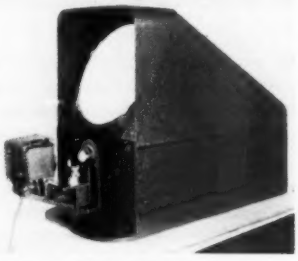
Geared-head, fan-cooled motor has a motor-mounted disk brake. The brake can be supplied for either stopping or holding applications.

Both motor and brake are totally enclosed and dust tight, being especially designed for use in atmosphere containing non-explosive dust, vapors, and other injurious materials.

The unit is manufactured in ratings from 2 to 15 hp and in AGMA speeds from 280 to 30 rpm, inclusive.

Dual cooling system provides an internal fan to circulate air inside the motor and an outer fan to pass a blast over the case. The motors have labyrinth seals; lubricated-for-life ball bearings; a herringbone rotor; and a simplified gear system in the head.

Sterling Electric Motors, Inc., Los Angeles, Calif.



Portman Optical Projector Has Large Work-Holding Area

The working stage area of 6½x5 in. on these optical projectors makes it possible to setup and check awkward shaped parts with ordinary clamps and blocks. Other features include: 14½-in.-dia image screen, rigid chassis assuring permanent alignment of all optical components, and a high-intensity illumination system.

Known as the Model P-5, the projector may be equipped with power lens units of 10X, 25X, 50X, 90X, or 100X magnification.

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NEW BOOKS

ASTM STANDARDS ON COPPER AND COPPER ALLOYS — *Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 542 pages. Price: $4.35, heavy paper cover; $5.00, cloth cover.*

With industry converting to military production, the need for up-to-date manuals of standards is a pressing one to many manufacturers. New and perhaps unfamiliar specifications for products call for alloys conforming to "ASTM B 36-50 T," for example. What are the compositions of these brasses, what are the hardnesses and tensile strengths of these strip materials?

The latest edition of these standards is timely, being dated Jan., 1951. It includes 108 ASTM standards. These are recommended for industry usage because of substantial agreements of the various groups represented on the technical committees of the society.

•

PRESSURE PIPING. *101 pages. Published by the American Society of Mechanical Engineers, 29 West 39 St., New York 18, N. Y. Price $3.50.*

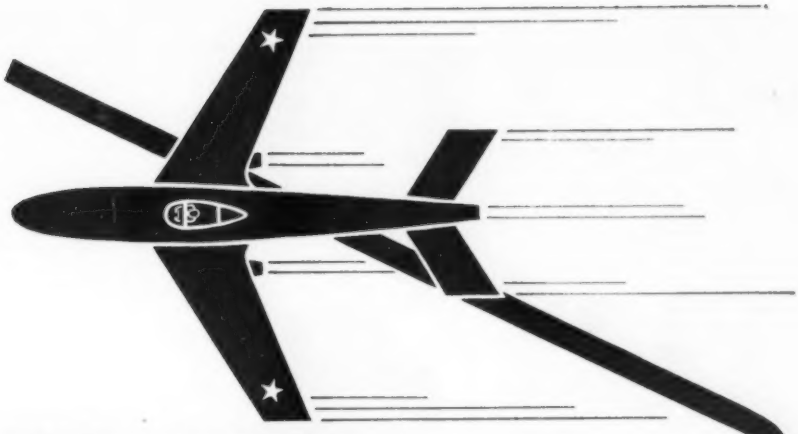
The revised code for pressure piping, American Standard ASA B 31.1-1951, includes data on code requirements for installation of gas and air piping systems in industrial plants. Specifications for materials and fabrication of equipment are included.

•

NON-DESTRUCTIVE TESTING. *164-page symposium STP No. 112. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price $2.50.*

Six papers and discussions thereof are designed to acquaint management with the actual or potential values of recognized methods of non-destructive testing in promoting higher quality or more economical production.

These papers cover: selection of non-destructive tests, discontinuities that can be revealed in case and wrought products, effect on economics of casting, radiographic inspection of steel weldments with radioactive cobalt 60, economics of



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in the

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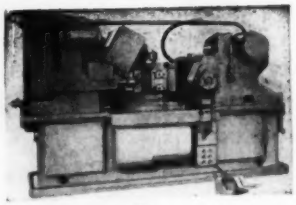

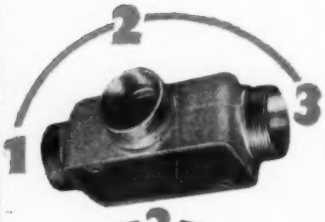

The outstanding advantage of this machine is ability to handle operations on one, two or three ends of a piece simultaneously or in sequence, *without changing set-up* or rehandling. It is the only standard machine that will do this.

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Work-Factor Timestandards. Seven pages. Published by the Work-Factor Co., 366 Madison Avenue, New York 17, N. Y. Price $1.

Data sheets provide information on application of motion-time work measurement of manual tasks on job-lot industrial production. The sheets summarize work-factor time standards systems. Examples of use are given.

•

BEHIND THE GENERAL MOTORS WAGE PROGRAM—*By H. W. Anderson, vice-president, General Motors Corporation. Published by Research Division, California Personnel Management Association, Berkeley 4, Calif. 14 pages, 8½x11, paper-bound. Price $1.*

This pamphlet is a stenographic brief of an address by H. W. Anderson in which he reviews the development and explains the philosophy of General Motors current wage agreement. Emphasis is on the principles governing labor-management wage relations, rather than specific contract details.

•

PROCEEDINGS, THIRD ANNUAL CONFERENCE—COUNCIL OF PROFIT SHARING INDUSTRIES, *First National Tower, Akron 8, Ohio. 117 pages, 8½ x 11, paper-bound. Price $2.50.*

Twenty-five talks by executives, labor union officials, and employees of companies with profit-sharing plans, as well as round-table discussions, cover problems of profit-sharing and their solution. Also included is a list of over 300 member firms, with officers, type of business, and address.

•

MAXIMUM UTILIZATION OF EMPLOYED MANPOWER—*Industrial Relations Section, Princeton University, Princeton, N. J. 54 pages, paper-bound. Price $1.*

First compiled during World War II, this pamphlet has been revised to help managements check their policies and procedures against hundreds of plants surveyed to obtain data upon which suggestions for reducing manpower losses are based.

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Full high-speed steel teeth for long wear, securely held in a tough alloy steel plate, make this the top production saw for heavy duty cutting. The teeth hold their cutting edges at high temperatures, permitting feeds of nearly double those of solid saws on ferrous and non-ferrous metals. All teeth are perfectly ground to side, top and down clearances, and are easily replaced.

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Among the many topics covered are inefficient managerial organization, poor plant layout, inadequate equipment, turnover, selection, training, and in-plant conditions. Joint authors are Dean Kenneth H. Condit, School of Engineering, and J. Douglas Brown and Helen Baker, Director and Associate Director, Industrial Relations Section.

•

HILFBUCH FUR DAS RAUMEN VON WERKSTUCKEN. *By Arthur Schatz. Published by Carl Hanser Verlag, Munich, Germany.*

A practical manual of internal and surface broaching, written in German, this book describes modern practice, broach design, broach sharpening, and the design of broaching machines and fixtures.

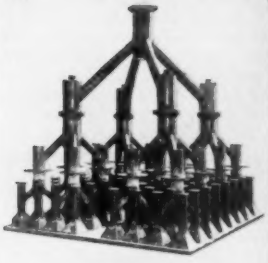
Much of the equipment shown is of American or British manufacture, although some German examples are given. The author has apparently drawn heavily on American sources, as 15 of the 38 items in the bibliography would indicate. A thorough knowledge of technical German is required for an understanding of the book.

•

HOW TO RUN A LATHE (50TH EDITION). *Published by South Bend Lathe Works, South Bend 22, Ind. 128 pages. 8x5¼. Price $0.25, paper cover, $1.00 imitation leather.*

For 44 years, machinists have found this book a most convenient and

"So I told him if he didn't like my work to get some other monkey."



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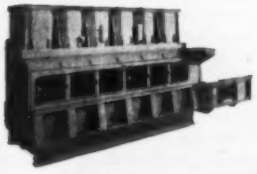
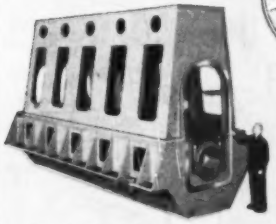
Pressure Vessels for the Chemical and Allied Industries.

Heavy Press and Machine Frames and Bases for the Machine Tool Industry.



Diesel Engine Crank Cases and Frames for the Marine and Electro-Motive Field.



Crank Cases, Frames, and other Parts for Manufacturers of Marine Steam Engines of Uniflow or Multiple Expansion Type.

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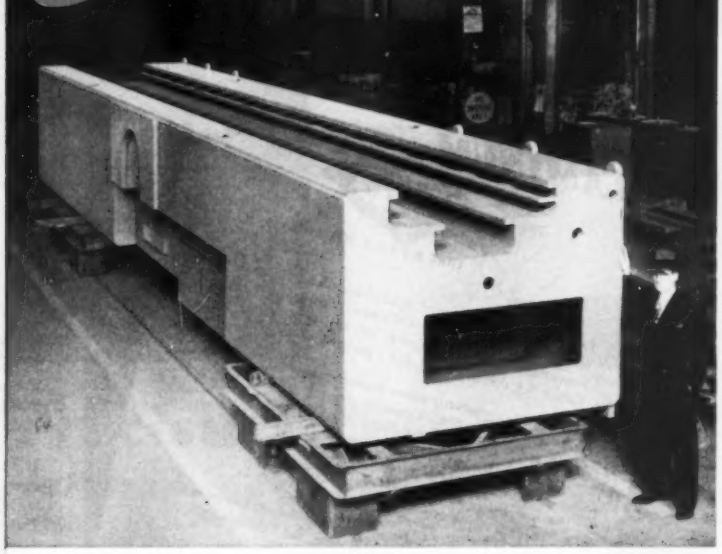

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practical reference on all phases of lathe operation. To the student and apprentice it is a textbook that should be rated as indispensable.

The material is divided into 11 chapters, starting with a history and development of the lathe, and continuing from setting up and leveling the machine, through all the various phases of operation, to special and unusual jobs. There are more than 350 illustrations, so little is left to the imagination, and the language is clear and non-technical.

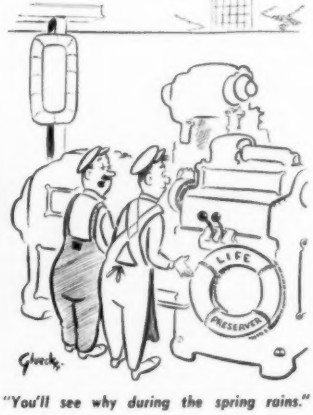
Other editions are available in French, Spanish, Chinese and Portuguese.

•

WELDING, JOINING AND CUTTING OF GRAY IRON. *By C. O. Burgess, Published by Gray Iron Founders' Society, Inc., 210 National City-East 6th Bldg. Cleveland 14, Ohio. 36 pages. Price $1.50 to non-members.*

This is the second of a series of manuals which are, in effect, preprints of the various chapters of the forthcoming Gray Iron Handbook. It presents clear, concise information on the various methods of gas and arc welding with different types of electrodes and filler rods. Brazing and braze welding are also considered, as are the various special joining processes, such as soldering, thermit welding, flash and pressure welding, and bimetal casting. Torch and arc cutting are also covered.

The material presented is entirely practical and well illustrated, and an amazing amount of information, of great value to the welder, as well as to the designer, has been packed into comparatively small space.



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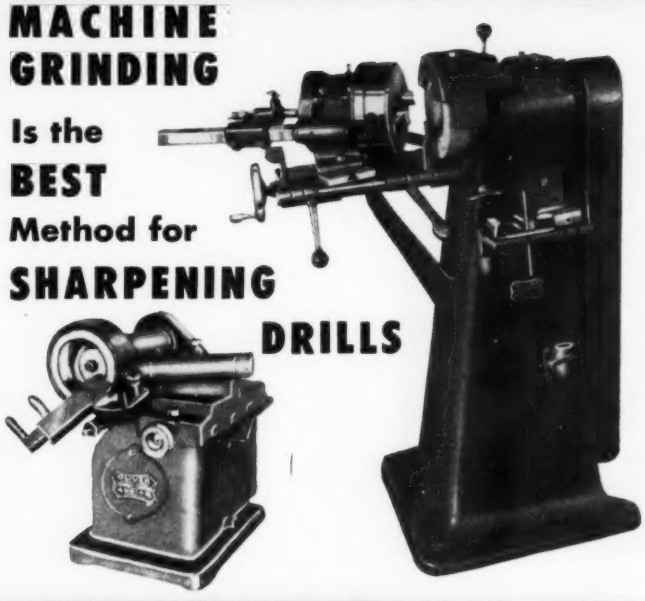

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ROUND TABLE *Discussion*

SHOP FBI

I THINK the gentleman who wrote "Shop FBI" must have been following me around. It would be a few years back. I was young, just "out of my time," and working the afternoon shift in a western machine shop.

In our toolroom there was one lathe—a 10-in. Lodge and Shipley that was a honey. Nobody except good old Jim Berryman dared touch that lathe; Jim made our taps, reamers, and other tools on it. He kept that machine in immaculate condition, and it was extremely accurate.

One afternoon I had a special bolt with a fine AL&AM (SAE to you) thread on it to make. After turning up the bolt, I was faced with the problem of chasing the thread. I looked longingly at Jim's 10-in. baby, which was just right for the job, but I didn't have nerve enough to even think of using it. Fred Colvin will understand just why I didn't dare even breathe in front of that machine.

However, I did mention the matter to Freddie. Freddie was a new man, a boomer off the Wabash, and a lad with no hampering concept of shop policy, and no inhibitions in respect to machine-tool sanctity.

"Use that 10-in. in the toolroom," suggested Freddie; "it's just right for the job."

"I don't dare," I answered. "If anything happened to it, the boss would skin me alive."

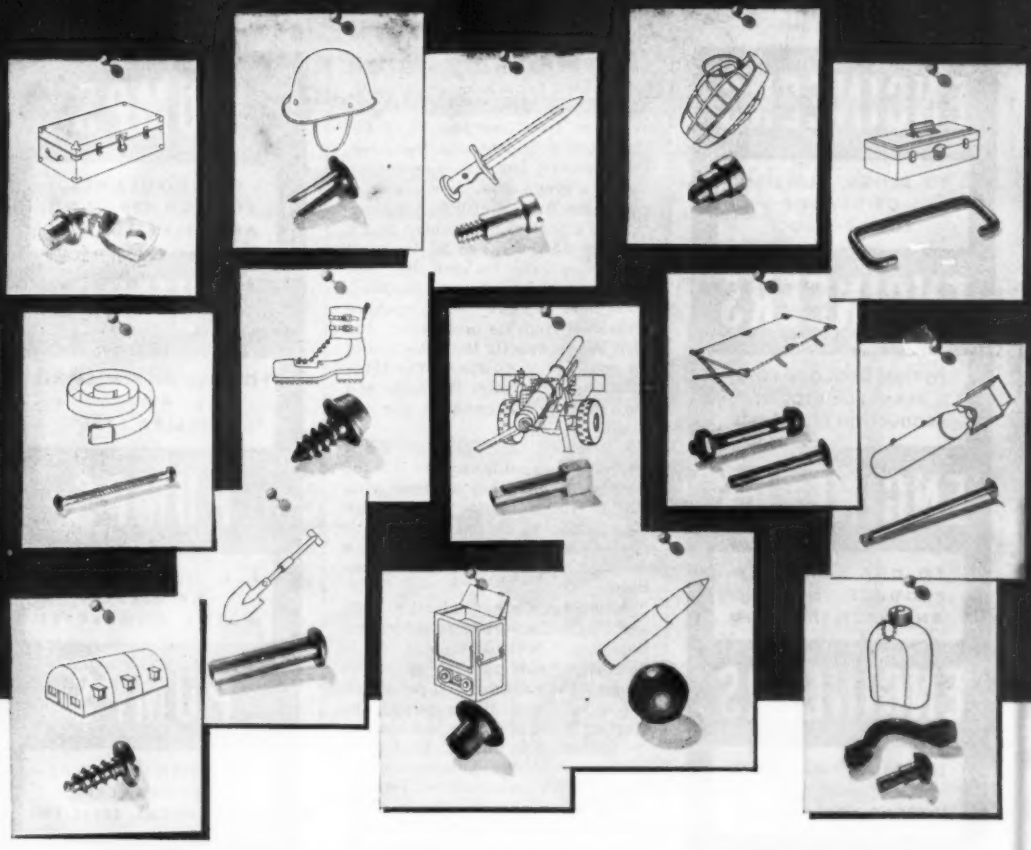
"Set it up," he instructed me; "I'll chase it for you—nothing to it."

Freddie was so certain of the matter and himself, that I believed. Faith is a great thing. So I set the job up and called Freddie:

"There she is. I left 0.003 in. on for a finishing cut. Take it down to size, and you're ready for the thread."

Freddie set his tool, started up the machine and threw in the feed. There was an agonizing clash of gears, and then a very unhealthy chattering. The pinion behind the apron was stripped. It seems the carriage had been locked in position, and neither Freddie nor I had been smart enough to check *that*.

Freddie lied like a major the next day, and I regret to report that I lied right with him. We just didn't know anything about it. Before that happened I had been afraid of the boss only; now I was afraid of the boss, of Jim Berryman, and of Freddie. So I



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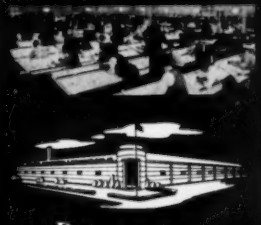

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INQUIRIES PROMPTLY ANSWERED

learned very early in life 'tis best for one man to operate one machine.

When we want results in this world we have one general of the army, one president, one treasurer, one governor, one mayor, one foreman to a group, and one operator to a machine. Now, of course, if the machine is a production machine, and is operated on several shifts, we must have an operator for each shift. But the responsibility is still localized, fixed, and definite. Each operator takes over from his predecessor, and each knows exactly the condition of the machine at all times. The three operators are always the same and they still work as one man, one machine.

It is always the "open" or "shop" machines that get broken; or it is the private machine that someone without lawful authority uses which meets disaster. A machine that is open to anyone and everyone is a machine for which nobody is responsible.

All men do not have identical skill, and that is the sort of world we are living in. It is therefore still best to definitely forbid the use of certain machines to unauthorized personnel.

I have many times caused the starting boxes of certain machines to be padlocked in the off position to prevent breakage by inexperienced help. Every automobile can be locked to prevent unauthorized use, but so far machine-tool builders have not been enterprising enough to put Yale locks on their spindles or key mechanisms. I'll toss in for free the suggestion that every fine lathe, grinder, jig borer, hone, milling machine, horizontal boring machine should have a Yale lock on it, so that the machine can be kept intact for the responsible user assigned to it. That lock should be on the tool end, that is, the spindle of a lathe or drill press or grinder, and not back on the drive. It would be much cheaper to turn a key in a lock than to build fences around machines to prevent folks from using them.

James K. Matter
Detroit

•

IT IS to be expected that machine tools will give out once in a while, especially after they have been subjected to the wearing strain of constant production. The breaking down of a machine is more likely to occur when many operators have the use of it—look at the postoffice pen. In ordinary use, such as one would expect of a machine in a toolroom, a machine of quality should keep up year in and year out without any

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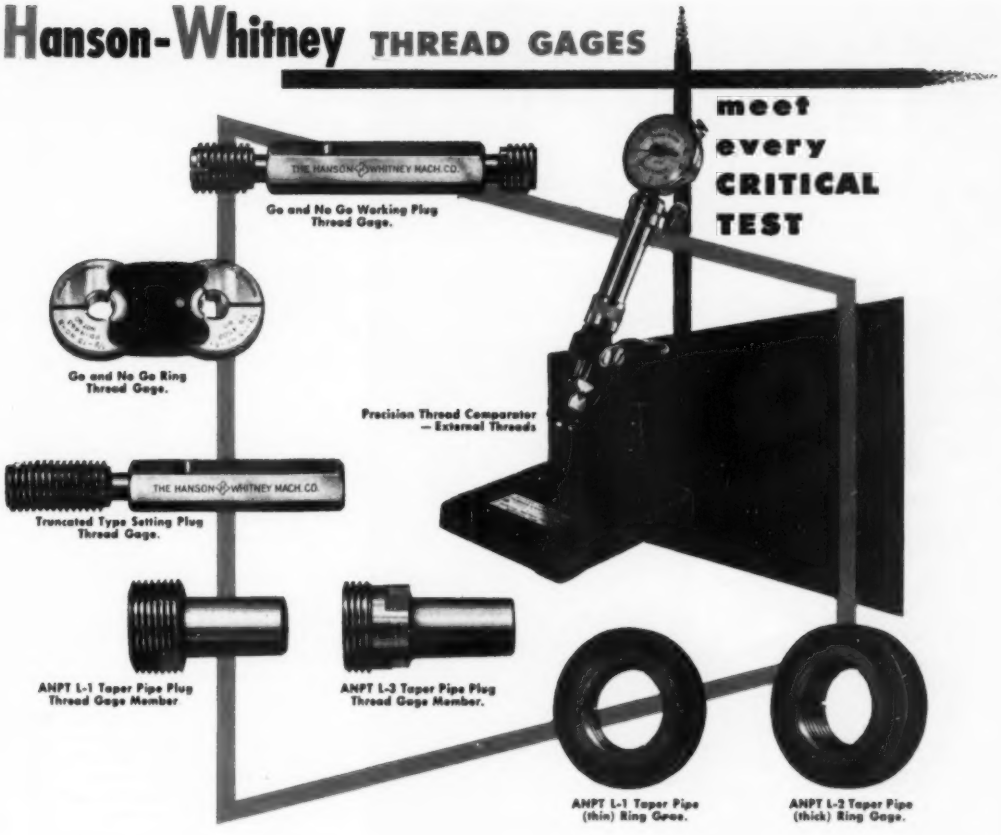
WRITE FOR CATALOG

Hanson-Whitney THREAD GAGES


meet
every
CRITICAL
TEST
Go and No Go Working Plug Thread Gage.
Go and No Go Ring Thread Gage.
Precision Thread Comparator — External Threads
Truncated Type Setting Plug Thread Gage.
ANPT L-1 Taper Pipe Plug Thread Gage Member
ANPT L-3 Taper Pipe Plug Thread Gage Member.
ANPT L-1 Taper Pipe (thin) Ring Gage.
ANPT L-2 Taper Pipe (thick) Ring Gage.

The defense program, now spiraling, is going to wear out thousands of gages — especially those of sub-standard quality.

To insure continual close tolerance production, and longer gage life, specify Hanson-Whitney Gages—manufactured of the best materials to exacting Federal Government Standards, subjected before shipment to a battery of rigid Hanson-Whitney tests.

The H-W gage group illustrated provides you with a complete inspection gaging set-up for practically any thread regardless of form, pitch, or major diameter.

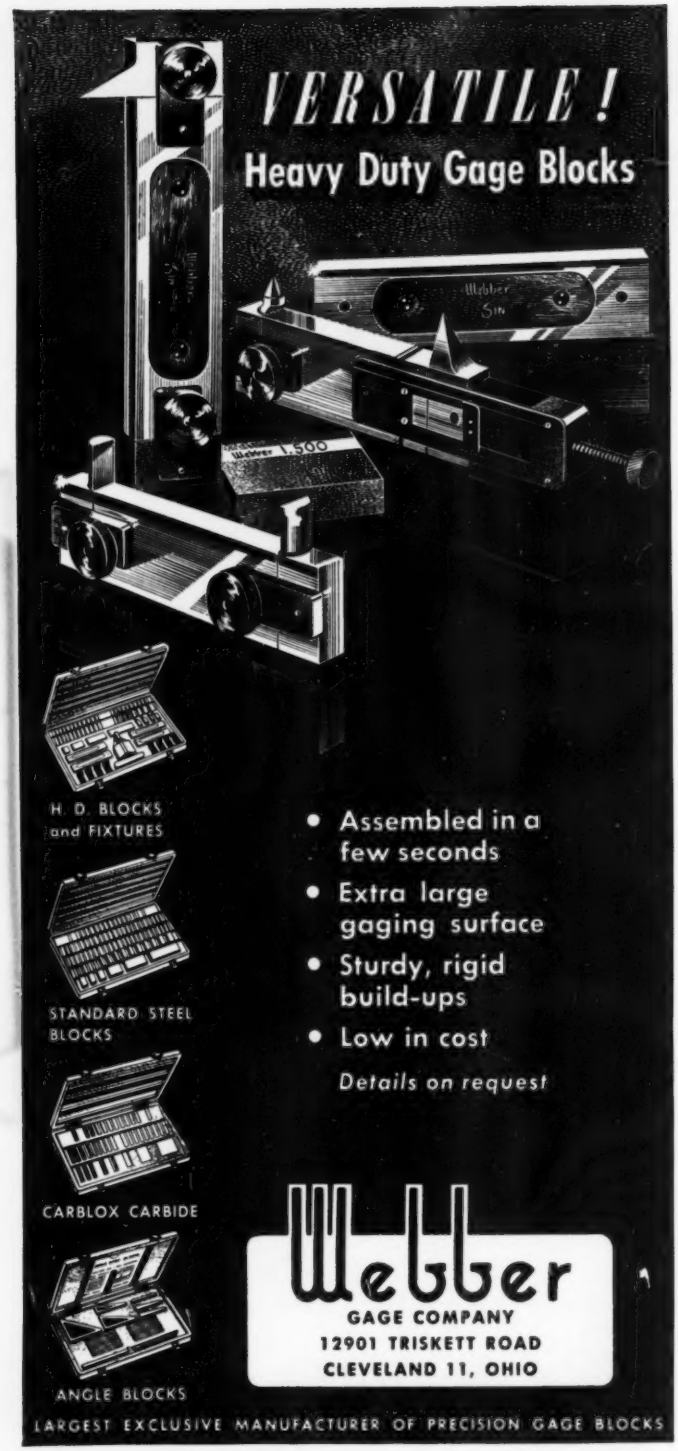
If your prints call for special design thread gages and gaging techniques, feel free to call upon our Engineering Staff for counsel . . . for this service has always been an integral part of our "Production Insurance" program.

HANSON-WHITNEY COMPANY • HARTFORD 2, CONN. • DIVISION OF THE WHITNEY CHAIN COMPANY

Hanson Whitney

PIONEERS OF FINISHED TAPS

SHW51

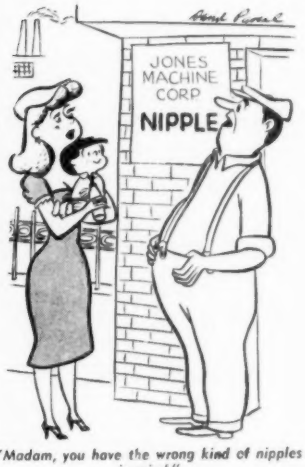


appreciable sign of weakness, because toolmakers, as a rule, are men of sound judgment as to what a tool is expected to withstand.

Unfortunately, we have the well-known hybrid—that mezzanine go-getter classified as being between a first-class mechanic and a second-class jackass—who is prone to raise particular hell with anything he comes in contact. Fortunately his damaging tactics are detected by the man in the tool crib who has the opportunity of examining the material that leaves his hands; would that we could have him check over the machines which suffer while he uses them.

It is this plough-pusher whom Ed needs to keep an eye on. Any breakdown would be reported to the foreman, ordinarily, but not by old Wreckum. He has a selfish philosophy of getting a job done, regardless of the effects of his abuses. I've worked around this destructive bulldozer and have seen him spin back the carriage of his lathe so rapidly that it cracked against the tailstock. It can readily be seen that the pinion and rack wouldn't react kindly to this treatment. This chap will do his best to avoid responsibility for any damage he may inflict.

There is nothing that gets a foreman's goat more than the knowledge that he has a man in his department who is damaging equipment. Accidents will happen to anyone and will be recognized by the boss as such. Naturally the head of a department is eager to know who is throwing a monkey wrench in his smooth-running shop and will welcome any suggestion that will enable him to find



"Madam, you have the wrong kind of nipples in mind."

READ THIS LETTER FROM A TYPICAL "E" STEEL CUSTOMER

J&L STEEL

check these points

...l Screw Products Comp...
INC.

...ttle
...& Laughlin Steel Corporation
...S & Laughlin Building
...ttsburgh, Pa.

Dear Sir:

We regret having been so slow in replying to your recent letter, but will attempt to give you some of the information for which you requested in regards to our experience with J&L E-33 steel.

We used a 1" R.A.6 Acme Gridley Automatic Screw Machine; the indexing time is approximately 1 second.

We are making a small Hub which is Drilled, Co. Bored, Formed and Tapped, but the time of the operation is limited to the time required to Drill and Co. Bore. We use a 5/16" cam on the tool slide for this operation.

Stock size is 5/8" Rd. on B-1113 C.R.S. We ran 1300 R.P.M. and used a feed of .003" per revolution.

✓ On E-33 steel we were able to run 1800 R.P.M. and use a feed of .0035" per revolution, which resulted in a net savings of 2 seconds per piece or 33⅓.

✓ At this speed on the E-33 C.R.S. we found the finish on the part to be better, the tool life longer by approximately 50% which greatly reduced our down time for tool changes and reduced our rejections as well.

✓ We took the job during a period when things were very competitive and work was scarce, and actually took this work on almost a break even basis, with our cost based upon using B-1113 C.R.S. But when we started using the E-33 C.R.S., we found that instead of having a dollar trading job on our hands we had converted it into a very good piece of business indeed.

✓ We have also used this E-33 steel on various other parts in sizes ranging from 1/4" dia. to 2 11/16" dia. and it is our opinion that, if the full advantage of the increased machinability is taken, the savings obtained more than offsets the increased costs of this type material even in the larger sizes.

In closing we have only one serious complaint to register and that is, why isn't there more of it available?

Very truly yours,

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

You can get real economies too by using J&L "E" Steel. Send for a free copy of our book, "A Progress Report on 'E' Steel." It lists grades available, physical properties and tells how others have used free-machining "E" Steel to advantage.

J&L "E" STEEL IS EASILY IDENTIFIED BY THE DISTINCTIVE BLUE COLOR ON THE END OF EVERY BAR.

JONES & LAUGHLIN STEEL CORPORATION

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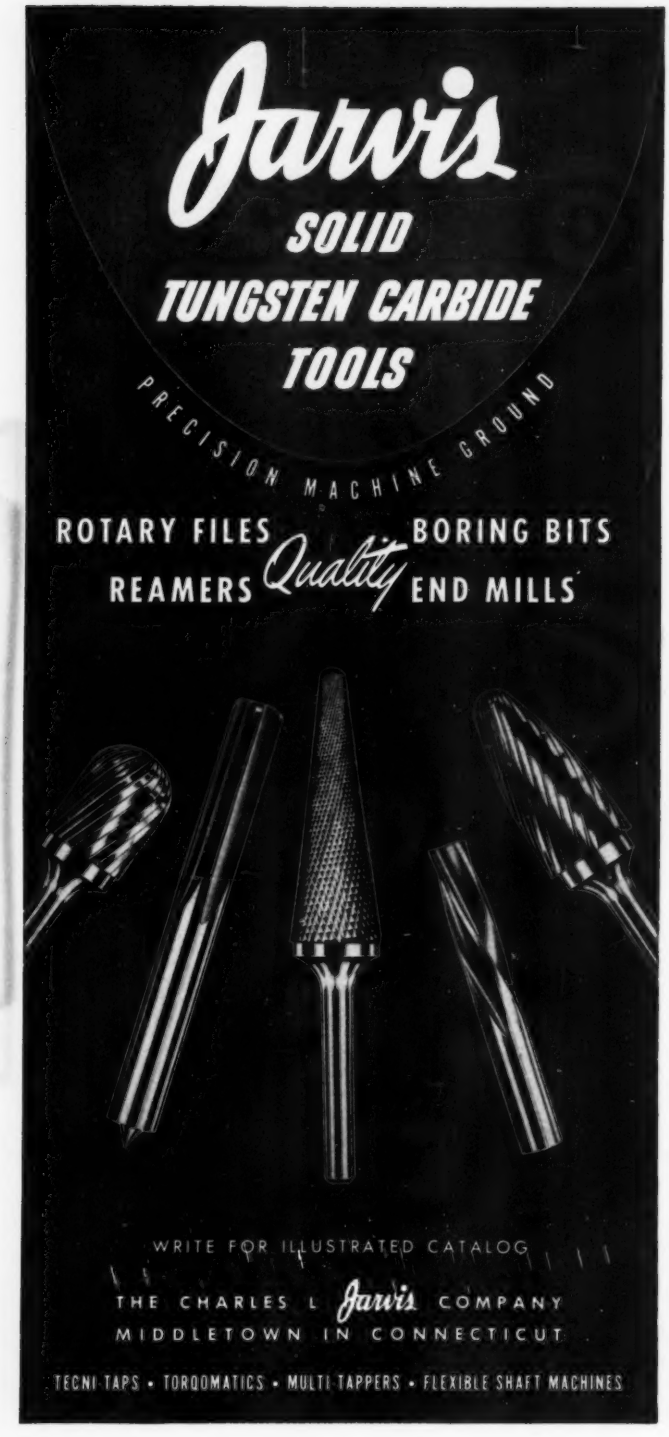
From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS, STRUCTURAL SHAPES • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS



the guilty culprit. There are some habits prevailing that prove to be destructive to equipment, especially when persons fail to use necessary precaution.

I recall hearing a foreman give a word of caution to one of his men who happened to be using a piece of half-inch pipe as an extension to a chuck wrench. "That's all right, Bill," he said, "if you're using that to save the wear and tear on your hands, but for the love of Mike remember the chuck can take only so much." One will often see a worker with a crowbar stuck through the spokes of a tailstock handwheel to enable him to advance a large drill through a piece he is drilling. Here is another case in which the good judgment of the operator has to be used in order that no undue strain he imposed on the nut and screw.

A thoughtless individual usually crowds his drill so that it takes ungodly bites, daydreams for a spell, and then gives out with another grunt. Many a cutting-off tool has been fed into the work by spurts, thereby throwing criminal burden on the poor screw and nut of the cross-slide.

All these things and many more are being done, no doubt unknown to the foreman, and the hour of reckoning arrives in which the abused part of the machine gasps out, "Oh, my aching back!" and then swoons. A foreman can often detect these damaging practices and a word of caution from him will prevent thoughtless abuse. While these potential abuses are far from the main issue brought up by Al and Ed, they are an element to be reckoned with which directly affects the sound condition of the equipment.

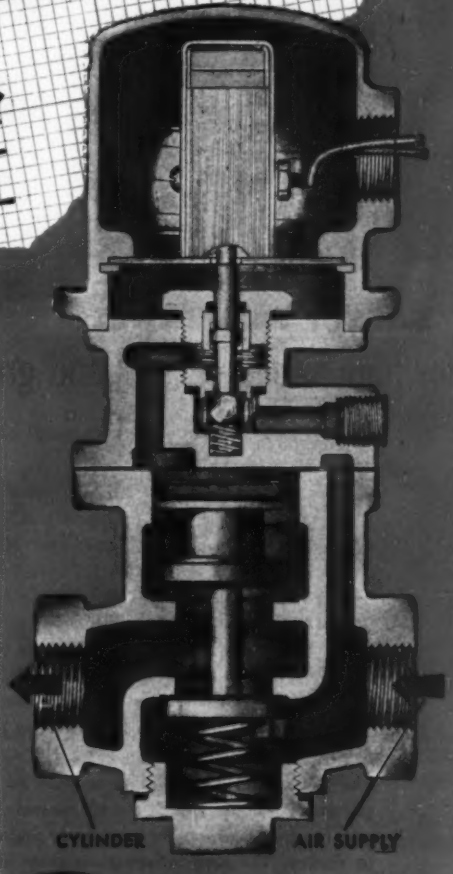
I have often felt that certain duties be delegated to trusted individuals which would relieve the foreman of his time and effort. One of these duties is responsibility for machinery upkeep. Were someone placed in charge of preservation of equipment it seems that less damage would result. I feel that the main difficulty can be greatly lessened if a thorough understanding is made at the beginning of a man's employment. He should be reminded that it is necessary for him to be on his toes at all times—that sound judgment should prevail in any action he undertakes.

The use of an FBI savors too much of "squealing." This is usually an offensive thing to the majority of shop men. The guilty one will eventually nibble at the cheese and get caught. In the meantime, Ed, carry on with an occasional loss and maintain cooperative harmony in the depart-

with Ross Full-Flo In-Line Valve you get Full Pipe Capacity!

THIS

NOT THIS



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- Low First Cost
- Low Operating Cost
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- Over 500 Straightway and 3-Way Models in ¼"—1¼" Sizes

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Ross makes valves only—hundreds of types and sizes. Take advantage of the experience gained in over a quarter century of concentration on control and application of air power!

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SAFETY INSURANCE

for high speed cutting and grinding!

Electro-Mist unit collector eliminates oil mist and smoke at the source.

The hazards created by coolants and the nuisance of oil mist and smoke from high speed grinding and cutting operations are completely controlled by AAF's Electro-Mist collector. A self-contained unit designed specifically for this purpose, the Electro-Mist exhausts material at the source by combining heavy duty industrial filters with electronic precipitation. Its unique design allows easy removal of collector plate assemblies, as well as access to all parts . . . without tools . . . thus reducing maintenance to a minimum.

The Electro-Mist also salvages as much as 2 to 5 gallons of coolant daily in its oil reservoir, which may be piped back into the machine or drained off, as desired. The above illustrations show how the plastic front of the hood may be raised for observation or adjustment, or when lowered, provides complete enclosure for the grinding or cutting operation.

If you are interested in safer, cleaner *high speed* grinding and cutting operations call your AAF representative today or write for complete details on Electro-Mist contained in AAF Engineering Bulletin No. 251.

AAF **American Air Filter**
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ment. Don't wreck the whole ship by letting it drift onto the rocks of extreme distrust.

J. Homewood
Ontario, Calif.

•

It is usual in any shop that some machines are damaged, especially now that young and inexperienced men are put to handle complicated tools. The nearest thing to finding the guilty person in this case would be to blame some helper or apprentice that Ed probably did not include in his boys.

It looks to me as if Ed is losing his head for too small a reason. He can blame himself for not giving his men adequate instructions how to run his new 10-in. lathe.

In most shops, there are always some boys or young men who want to meddle with the machines. There ought to be some rules regulating their activity. Why not put a sign on each machine they are forbidden to run, like they do in woodworking shops?

Young men in a toolroom must always be given a chance to work on some machines, otherwise they will never learn how to do a good job.

Ed's conclusion in suggesting a shop FBI is entirely out of proportion to the damage done.

If Nicholson is an old-timer and the best lathe hand in the shop, he should not be blamed, but if Ed has boneheads in his crew whose duty it is to work on his machines, then he has not given his men proper instructions.

The man who did the damage is afraid Ed would fire him if he confessed. If Ed really wants to know who did it, he should promise nobody would suffer if he only told the truth.

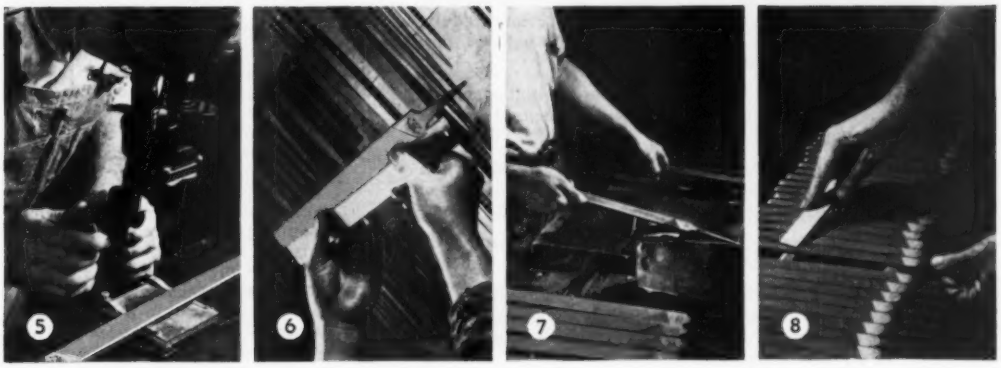
Al is right in suggesting that Ed report the damage and order a new part. The best reason to advance would be to claim the gear had been overloaded. I don't think the Big Boss would care to know how it happened. If he did, Ed should tell him he had tried to find the guilty person but failed.

Setting up a fake job as Al suggests is out of the question. If Ed did that, it seems to me, he would be unworthy to be foreman any longer. Neither would a system of signing for each job be suitable. It would cost more than it saved. Signing for small tools that anybody may steal is a different thing.

It is absolutely wrong of Ed to take the attitude that he cannot trust any of his men, just because

Why Nicholson can guarantee

TWELVE PERFECT FILES IN EVERY DOZEN



1. Checking grain structure of steel to assure proper heat treatment.
2. Inspecting "fracture" samples of file blanks after annealing.
3. Checking drawfiled three-square blanks for twists.
4. Checking drawfiled flat blanks for levelness.
5. Inspecting file teeth with microscope.
6. Checking edge of mill or flat files for proper taper.
7. Ringing finished files for soundness.
8. Testing finished files for uniform sharpness and hardness of teeth.

IT ISN'T EASY to stand up under a guarantee like that. But Nicholson has always believed that "A thing worth doing is worth doing well." As a result, Nicholson and Black Diamond files are widely regarded as the most uniformly high-quality products of their kind.

From the inspection of each batch of Nicholson-specified steel to the final packaging, every basic step of production is subjected to rigid controls, checks and tests. A few of them are shown here.

What do such high standards and such a sweeping guarantee mean to you? That your confidence in Nicholson quality is quickly gained—and permanently established. That *value*, not "price," is the best basis for buying files . . . and you get it in the *higher efficiency, faster production* and *longer life* of either of these top-quality brands: NICHOLSON and BLACK DIAMOND. Consult and buy from your industrial distributor.

FREE BOOK, *"FILE FILOSOPHY,"* gives 48 pages of further information on kinds, quality, use and care of Nicholson files. Invaluable to key production men. How many copies?

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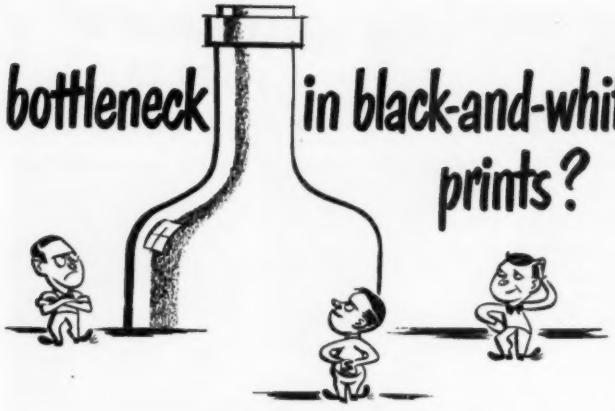

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The Bruning Model 93 BW machine makes prints up to 46 inches wide at speeds up to 30 feet a minute. Prints are fully developed, regardless of speed. They come out flat, dry, odorless, and ready for immediate use.

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- Duplicate tracings can be made on BW sensitized cloth or film—and changes or additions then made as desired with BW Eradicator Fluid and pen or pencil.
- Reports, records, correspondence and other paperwork can be copied in seconds and for pennies.
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some bonehead in the gang damaged one of his lathes.

A shop bureau of Instructions to brush up the skill of his men would perhaps prevent such damages, but a Bureau of Information would probably be of no use.

The rule of "one man operating one machine" is a good rule, but impossible to enforce since every available tool probably must be run night and day for several years to come.

A. E. Fristedt
Stockholm, Sweden

•

THEIRS NOT TO REASON WHY

In this case the employee turns in an idea to change the design of a die. The supervisor thinks the idea is a good one, but he is afraid the chief engineer will take the suggestion as criticism.

Problems or situations such as this can be worked out without fear of reprisal from those for whom we work. The supervisor should first contact the tool engineer and get his viewpoint on the change. If the supervisor, tool engineer, and employee are generally agreed on its merits, viewed from all angles, they should contact the Chief Engineer. They should then present the idea with their combined thoughts on this suggestion. They should ask his permission, help, and advice on making the change. In presenting the idea in this way, they all become a part of it. The chief engineer will be pleased when appealed to in this way. It is quite possible that the idea will not only be adopted but may be broadened to include other changes.

We sometimes get more than we expect from the other fellow when we yield a little. This is the harness within which men work for a smooth-working unit.

A. E. Salmons
Philadelphia

•

This problem of whether to change die design or part design is certainly one that many of our foremen face every day. It is one that calls for knowledge of foremanship. It can mean the saving of thousands of dollars, or the loss of the same amount. True, many times it becomes a problem of personalities. This certainly is a major disaster in any company. Ed is lucky to have a tool engineer who will listen to him. I have known plants where the foreman would not even have had that freedom allowed him.

In the consideration of this prob-

ASK BAIRD ABOUT IT!

HIGH PRODUCTION TOOLING

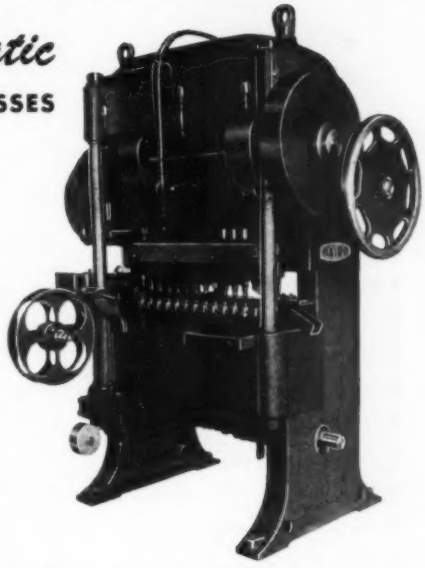
FOR REPETITIVE MANUFACTURE OF PARTS FROM COILED STOCK

check BAIRD *Automatic*

MULTIPLE TRANSFER PRESSES

Simply stated, this press combines, in a single cycle, operations that might otherwise require several smaller machines with an operator for each one.

There are so many varied tooling possibilities that it is impossible to enumerate them here. In ordinary operations the press automatically feeds coil stock for piercing, lettering, embossing, etc., then cuts the blank, places it in transfer fingers, moves it along to several other tool stations and ejects the finished piece. In addition, preformed material may be fed from the opposite end of press for many other operations . . . all completely automatic. A full set of tools (composed of punch and die blocks, their punches and dies, transfer slide and fingers) may be removed as a single unit . . . and a different set inserted, and in some instances without disturbing any adjustment . . . in a comparatively short time. Note the following example:



. . . a typical BAIRD tooling set-up

This is a complete die set with full complement of punches and dies in working position for the production of a special aircraft lock-nut . . . finished in one operation (14 stations). The transfer is in the loading position. After completion of stroke, work is pushed to transfer fingers by plungers operated by cams in back of and under the press. Production: 70 pieces per minute.

Full details of Transfer Press available in new bulletin . . . copy on request. Ask Baird about it!

the BAIRD MACHINE COMPANY
STRATFORD • CONNECTICUT

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

'Surface'
HIGH SPEED HEATING
FOR FORGING

- Lengthens die life
- Saves labor
- Improves working conditions
- Saves floor space
- Equipment low cost
- Saves metal
- Metallurgical improvements
- Cleaner forged parts
- Press or hammer rates increased
- Special holding atmosphere
- Gas or Oil firing
- Low fuel cost per ton heated

Explained in detail in BULLETIN SC-144

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SURFACE COMBUSTION CORPORATION
TOLEDO 1, OHIO

lem, let us look into the general situation which too often is found in our industries today. Let us find out why foremen cannot be free to help save money; why they go along, knowing that what they do is costing money. There must be a reason for this condition. So let us think back on the existing shop conditions.

We see an organization operating on a small scale where the owner-manager is the boss and foreman. He makes the decisions. His business prospers either through his efforts or due to existing conditions. He needs a larger organization. Up to now he has not accepted ideas from his help, for they were not experts as he was in his field. So now he goes outside of the organization and hires a chief engineer to design his products. Yes, he still gives the orders, but the chief he has hired is an engineer who believes that shop men know little or nothing about product design. This chief has been hired by the boss because of this belief. The owner now has to have a foreman, so he goes out into the shop and chooses a man. This man knows production, knows dies and design, and has probably been with the company for years. The boss thinks he has done a big favor to the man in making him a foreman. But the boss never gives any instructions on how to be a good foreman, or on how to get along with people. And worst of all, he does not tell the foreman anything about company policy.

Our engineer proceeds with a design, taking into consideration only the theory of the design and never once analyzing the practical side of the picture. He never cares how costly it will be to tool and produce. He is interested only in design.

On one hand we have a man with a knowledge of theory only, and on the other hand a man who knows the practical side of the problem. A clash must result. The boss, while siding with the engineer, is also setting up a whipping post for the foreman. The foreman must get the item produced economically. He must use the design, for it was created by an expert. Our poor foreman knows that he must always lose.

Now our boss has created a hatred of all engineers in the mind of his foreman. A sad thing, for it not only hurts this company and its chances of survival, but it hurts the engineering profession.

We have spoken of chief engineers . . . but this applies all the way up and down the line. It not only applies to engineers, but also to top supervisors. Don't think you know it all. Listen to the man on the firing line.

The only answer to this problem of foreman-engineering harmony is proper training by top management. If they want a harmonious company, they and only they can make one. See that both line and staff personnel are properly trained and that they do their job properly. See that suggestions are taken and that no one has his throat cut later by making suggestions. Yes, it can be done and it is surprising how little it costs. It is also surprising how much is gained in extra production and in a lowering of operating costs by having a company that can live together.

Our foremen are not to blame for many of the attitudes that they take.

(*Continued on p.* 192)

NO, THEY ARE NOT STATUES....THEY ARE KNOWN TO OUR CRAFT AS MILLWRIGHTS ...I'M NOT SURE, BUT I THINK THEY ARE WAITING FOR THEIR FINAL PAY CHECK!
"INDIRECT ORDERS"
O'CONNOR

More Air Force Contractors Tell Subcontracting Needs

CHICAGO—The following manufacturers—all exhibitors at the Air Materiel Command's prime contractors' exhibit held here Apr. 30-May 9—have indicated to AMERICAN MACHINIST the types of work for which subcontractors are wanted.

In some cases the prime contractors still are in the process of building up their production programs and therefore are not quite ready to place subcontracts. But in these cases, the prime contractors are anxious to complete soon the job of surveying the facilities of possible subcontractors, so orders can be let in time to insure proper functioning of assembly lines in the prime contractor's plants.

ARNOLT CORP.

Having prime contracts to make several different types of ordnance and aircraft parts, Arnolt Corp., Warsaw, Ind., needs subcontractors with facilities for producing steel and aluminum alloy castings, and for machining a variety of parts. Send list of facilities to H. M. Henderson, manager, government sales.

BENDIX AVIATION CORP.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., needs additional suppliers of aluminum alloy forgings and magnesium alloy permanent mold castings. Also needs subcontractors equipped to undertake special machining of alloy steel strut members for aircraft landing gear assemblies, as well as facilities for machining large aluminum and magnesium alloy carburetor body castngs. Write to: G. L. Lyman and D. Hukill, management staff. Facilities for producing aircraft radio and radar equipment are wanted by Bendix Radio Div., Towson, Md. Contact: Robert E. Wine, manager of subcontracting.

BUICK-OLDSMOBILE-PONTIAC

Subcontractors to make parts for the Republic F84F Thunderjet fighter are wanted by Buick-Oldsmobile-Pontiac Div., General Motors Corp., Kansas City, Mo. About two-thirds of all machining operations on parts for this plane will be subcontracted. Also needed are sheet metal stampings and subassemblies, die castings, forgings, etc. Many of the parts must be made to very close tolerances. Contact: C. C. Brandou, director of purchasing; Harold F. Griffey, subcontracting; or A. W. Palms, subcontracting.

FORD MOTOR CO.

Having a $565-million prime contract to make the Pratt & Whitney R-4360 radial aircraft engine for the B-36 bomber, the Aircraft Engine Div., Ford Motor Co., Chicago, will subcontract more than 85% of needed production and service parts. About 1500 to 1600 different parts will be made by subcontractors. These include a wide range of parts, such as stampings and sheet metal assemblies, formed pipes and tubing, rubber parts, springs, bushing and bearings, and a wide variety of machined parts. Machining tolerances and finishes must be to aircraft engine quality standards. C. O. Slaght is general purchasing agent, E. M. Owen is purchasing agent in charge of the Production Purchasing Dept., and O. D. Hanna is purchasing agent in charge of the Non-Production Purchasing Dept.

GLOBE CORP.

Sheet metal parts and electric control harnesses (cables) for the KD2G-2 "Little Henry" jet target plane will be subcontracted by the Aircraft Div., Globe Corp., Joliet, Ill. Contact: Elmer F. Mangold, director of purchasing.

CHICAGO AERIAL SURVEY CO.

Parts for aerial cameras and auxiliary devices are wanted by Chicago Aerial Survey Co. Subcontracts to be placed include the machining of aluminum alloy parts to extremely close tolerances. Production quantities are limited. Write to: E. Swanson, plant superintendent.

CROSLEY MOTORS, INC.

Sources capable of furnishing cast semi-steel crankshafts, weighing about 20 lb and cast aluminum alloy crankcases weighing about 8 lb are needed by Crosley Motors, Inc., Cincinnati. Contact: Charles Skenbill, purchasing agent.

McGRATH & CO.

Having prime contracts to make bomb shackles and bomb hoist slings, McGrath & Co., St. Paul, Minn., needs subcontractors equipped to do sheet metal blanking and forming opertions, particularly in half-hard stainless steel and aircraft quality alloy steel. Quantities needed are fairly large. Write to: Roger McGrath.

VICTOR ADDING MACHINE CO.

Victor Adding Machine Co., Chicago, wants subcontractors to make precision screw machine parts, machine small castings, and produce small precision gear trains. Contact: L. E. Covey, general purchasing agent.

WOODWARD GOVERNOR

Subcontractors equipped to machine and finish-grind small precision parts for aircraft engine governors are wanted by Woodward Governor Co., Rockford, Ill. Alloy steel, stainless steel, aluminum alloy and magnesium parts are invloved. Contact: W. C. Bloom, Subcontract Div., Purchasing Dept.

Small Firms Get Navy Prime Contracts

WASHINGTON — Small businesses are now getting more than two-thirds of all Navy prime contracts, the Navy reports.

Vice Admiral A. G. Noble, chief of Navy Material, told a joint session of the Senate and House Small Business Committees that from July 1, 1950, through Mar. 31, 1951, more than 330,000 Navy prime contracts totaling $649 million were awarded to small concerns.

These contracts represent 69.5% of all Navy prime contracts, and 18.1% of all dollars expended by the Navy for procurement during that period, Adm. Noble said.

At Your Service for

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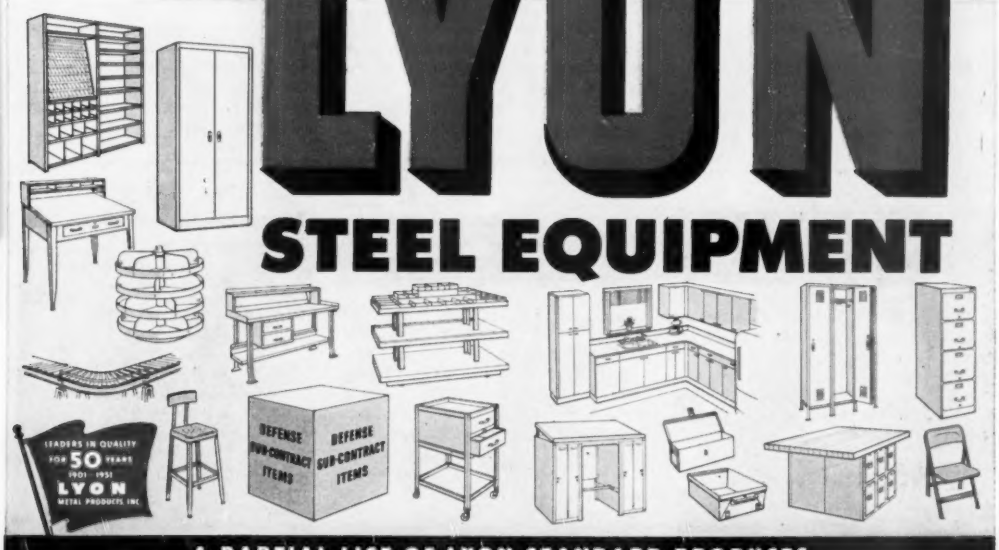

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- Cabinet Benches
- Storage Cabinets
- Welding Benches
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- Bar Racks
- Tool Boxes
- Parts Cases
- Economy Locker Racks
- Flat Drawer Files
- Tool Room Equipment
- Wood Working Benches
- Display Equipment
- Drawing Tables
- Revolving Bins
- Hanging Cabinets
- Filing Cabinets
- Folding Chairs
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
- Drawer Units
- Hopper Bins
- Tool Stands
- Shop Boxes
- Tool Trays
- Shop Desks

Pratt & Whitney Aircraft Suppliers Share $250 Million Defense Business

EAST HARTFORD, Conn.—To speed its aircraft engine production for the military services, Pratt & Whitney Aircraft, a traditional user of thousands of subcontractors, has doubled its purchases since the beginning of the Korean war, according to William P. Gwinn, general manager.

This year the engine division of United Aircraft Corp. will pay out $250,000,000 for the products of its subcontractors and suppliers. Ninety percent of the 5285 companies on the active P&WA subcontractors and suppliers list are classed as "small businesses" with less than 500 employees each. These firms are distributed through 34 states, with 2268 located in New England, of which 1498 are in Connecticut.

J. W. Dunnell, Pratt & Whitney Aircraft's purchasing manager, said that a total of 30,000 parts for both piston and jet engines are currently being bought from outside sources. Since the first Wasp engine was built in 1925, subcontracting has been a basic policy of Pratt & Whitney Aircraft. Many of its subcontractors have been supplying the aircraft engine firm for 25 years.

• **Advantages** of the permanent subcontracting policy include:

A greater flexibility of its own factory operations. Faster expansion in periods of national emergency when production demands are accelerated. The development of a basic team of specialists to supply certain equipment items at lower cost than would be possible if these specialized items were added to the Pratt & Whitney Aircraft factory production load.

Policy has been to subcontract about 50% of the work at P&WA and this policy was continued after World War II even when the aircraft industry operated at a greatly reduced level. The engine division thus retained its basic network of subcontractors and suppliers built up before and during World War II ever, though the volume of Pratt & Whitney Aircraft business for individual firms fell far below the wartime levels.

As a result Pratt & Whitney Aircraft entered the present period of expansion with a solid base of subcontractors who were familiar with its methods and quality requirements and were capable of stepping up their individual operations to match the pace of Pratt & Whitney's expanded production.

By concentrating on intensifying production from the existing subcontractors, the Pratt & Whitney Aircraft purchasing department has been able to get a faster flow of subcontracted parts than would have been possible if it had been necessary to find additional subcontractors and familiarize them with Pratt & Whitney Aircraft standards. New subcontractors have been added to the network to meet new requirements that have arisen primarily as a result of Pratt & Whitney Aircraft's increasing role in jet engine production.

• **Present intensification** and expansion of the subcontracting program is based primarily on the greatly accelerated production programs for the J-48 Turbo-Wasp, the most powerful jet engine now being delivered to the Air Force and Navy, and the R-4360 Wasp Major. For the J-48, parts such as gears, gaskets, sheet metal components, friction bearings, fuel pumps, igniter plugs, ignition and fuel systems and complete afterburners are being subcontracted. For the Wasp Major, subcontractors are furnishing carburetors, fuel hoses, propeller shafts, supercharger impellers, crankcase parts, bearings, gears and many other of the 23,000 parts that make up this engine.

Additional subcontractors will be required to support the production program for the two axial-flow gas-turbine engines designed and developed by Pratt & Whitney Aircraft. These are the T-34 turboprop, and the J-57 Turbo-Wasp. Pratt & Whitney Aircraft is building additional facilities of its own in East Hartford and North Haven, Connecticut, to handle these production programs. The proportion of subcontracting on these two axial flow engines will probably equal the present 50% ratio of Pratt & Whitney Aircraft's operations due to the extreme urgency of military requirements for these engines.

• **Among the new subcontractors** recently added to the Pratt & Whitney Aircraft network are:

Torrington Needle Bearing Company, Torrington, Connecticut—needle bearings for piston engines.

Engineering Research Corporation, Riverdale, Maryland—afterburners for the J-48 Turbo-Wasp engine.

Hotpoint, Inc., Cicero, Illinois—sheet metal parts and assembled components for the J-48.

Fuller Brush Company, Hartford, Connecticut—finishing and machining operation on piston and jet engine parts.

I.T.E. Corporation, Philadelphia, —afterburners for the J-48.

Frey Manufacturing Company, Hartford, Connecticut — machine screws for jet and piston engines.

Ford Motor Company, Detroit, Michigan, for tool design work on jet engines and manufacture of jet engine components. This contract is apart from the previous license arrangement under which Ford will build the P&WA Wasp Major engine.

DEFENSE PRODUCTION NOTES

LOCKHEED Aircraft Corp. will distribute approximately $300 million of business to suppliers of goods and services throughout the country this year. Last year the figure was $132 million. Lockheed has a department of 114 buyers making purchases at the rate of $261,000 an hour.

GOODYEAR Aircraft Corp., Akron, has a multi-million dollar contract for manufacture of parts to be used on North American Aviation's T-28 advanced trainers. The parts will be made at Goodyear's plant in Phoenix, Ariz.

FORD Motor Co. will build a new plant, its location as yet undecided, to produce J-40 jet engines under a Navy contract licensed by Westinghouse Electric Corp. Both subassemblies and parts are expected to be subcontracted on the job. It is expected that more than half the parts of the huge powerplant will be placed with suppliers which may number at least in the high hundreds.

BORG-WARNER Corporation's Ingersoll Products Div. has a $5 million contract for production of large caliber steel cartridge cases for ammunition.

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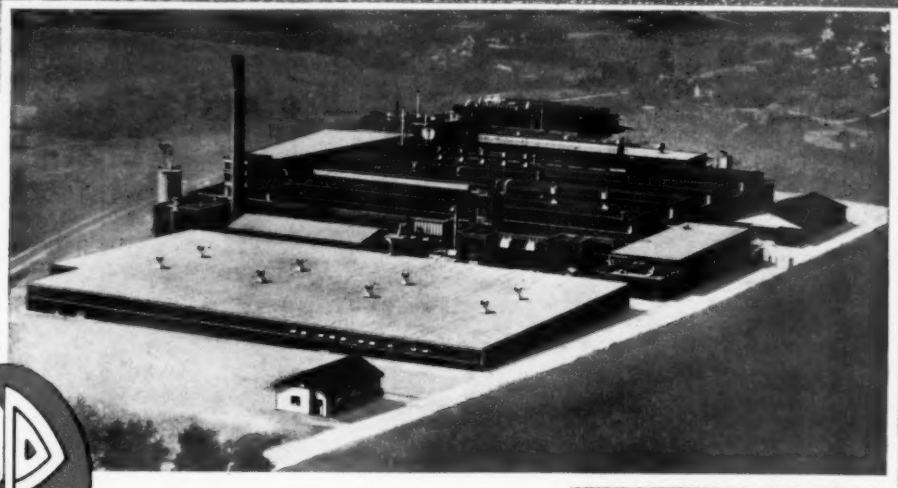

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LATEST DEFENSE CONTRACTS

ARMY ORDNANCE AWARDS

Tank-Automotive Center, Detroit

DeVilbiss Co., Toledo—compressor, air portable piston type; compressor, air gasoline engine driven; gun, paint, spray.

Winpower Mfg. Co., Newton, Iowa—generator A.D. portable, gasoline engine driven.

Warner Gear Div., Borg-Warner Corp., Muncie, Ind.—gear, cluster, transmission.

Industrial Facilities Co., Inc., Pontiac, Mich.—housing, engine clutch assembly.

Continental Aviation & Engineering Corp., Detroit—beam, engine support.

Linn Coach & Truck Div., Great American Industries, Inc., Oneonta, N. Y.—semi-trailer, mobile; dental unit with equipment.

Allis-Chalmers Mfg. Co., Milwaukee—extension, fork.

Henney Motor Co., Inc., Freeport, Ill.—automobile, ambulance ¾ ton, 4x2 metropolitan.

D. W. Onan & Sons, Inc., Minneapolis—generators.

Dockson Corp., Detroit—truck, oxy-acetylene cutting & welding outlet.

Chrysler Corp., Detroit—truck, ambulance, 1 ton 4x4.

Kenworth Motor Truck Corp., Seattle—cylinder, kit.

Knorr-Maynard Inc., Detroit — armature, windshield wiper assembly.

Fay Machine & Engineering Corp., Cleveland—segment, periscope.

United Motors Service Div., General Motors Corp., Detroit—spotlight, turret assembly.

American Baler Co., Bellevue, Ohio—anchor, assembly.

Ingersoll-Rand, Detroit—hammer pneumatic; wrench pneumatic.

Diamond T Car Co., Chicago—carrier, power; seat, left; kit, repair, harness, seal, gear shift.

Milwaukee Gear Co., Milwaukee — pinion, rear forward axle, differential.

Ainsworth Mfg. Corp., Detroit—frame, windshield, tubular.

Allen Industries, Inc., Detroit—cover, turret assembly.

Montague Equipment Co., Troy, Ohio—sand, engine, overhaul.

International Harvester Co., Washington, D.C.—bus, body-on-chassis, 37 passenger, 4x2; spare parts for maintaining the buses.

Linn Coach & Truck Div., Great American Industries, Oneonta, N. Y.—trailer, ¾ ton; spare parts for trailers.

Oilgear Co., Milwaukee—clutch, transmission over-running with gear assembly.

Industrial Facilities Co., Inc., Pontiac—sprocket, final drive; shaft, final drive sprocket.

GMC Truck & Coach Div., General Motors Corp., Pontiac, Mich.—bus, integral, diesel, 38-passenger 4x2.

Budd Co., Detroit—hub, rear wheel with cup assembly.

Singer Sewing Machine Co., New York—sewing machines, motor driven.

Chevrolet Motor Div., General Motors Corp., Detroit—trucks, carryall, ½ ton, 4x2 plus heater and defrosters; automobile, sedan, 5-passenger, light, 4x2.

Buick Motor Div., General Motors Corp., Detroit—automobile, sedan medium, 5-passenger, 4x2.

New York Ordnance District

Bogue Electric Co., Paterson, N. J.—automotive parts.

Standard Container, Inc., Montclair, N. J.—ammunition containers.

Mills Mfg. Corp., New York—inner liner assembly for cartridge case.

Chicago Ordnance District

Thor Corp., Chicago—ammunition, shell.

Madison-Kipp Corp., Madison, Wis.—ammunition; fin assemblies; fin for shell.

Eureka Williams Corp., Bloomington, Ill.—pump assembly.

Malleable Iron Range Co., Bever Dam, Wis.—medium sized shell.

Richardson Brothers, Sheboygan Falls, Wis.—front and rear guard hang.

Borg Products Div., Delavan, Wis.—metal parts for booster.

Northwest Automatic Corp., Minneapolis—metal parts for booster.

Detroit Ordnance District

Squiers Gage Co., Berkley, Mich.—spare parts, accessories and tools for fire control.

Michigan Jewelers Supply Co., Detroit—spare parts, accessories and tools for fire control.

Gear Grinding Machine Co., Detroit—facilities to increase production capacity of constant velocity joints.

Carboloy Co., Inc., Detroit — shot, 90mm, metal parts assembly.

Monroe Auto Equipment Co., Monroe, Mich.—shell, 57mm, metal parts assembly.

Argus, Inc., Ann Arbor, Mich.—telescope and carrying cases.

Pontiac Motor Div., General Motors Corp., Pontiac, Mich.—10mm dual automatic M2 gun and spare parts.

Los Angeles Ordnance District

Bendix Aviation Corp., N. Hollywood, Calif.—tank-automotive spare parts.

Harvey Machine Co., Torrance, Calif.—shell, 20mm.

U. S. Carburetor Co., Gardena, Calif.—tank-automotive spare parts.

Picatinny Arsenal, Dover, N. J.

Junior Toy Corp., Hammond, Ind.—liner and supplementary charge assembly for 105mm recoilless gun.

Eagle Lock Co., Terryville, Conn.—primer, percussion.

Wilpet Eng. & Mfg. Co., Kearney, N. J.—closure, nozzle, for 3.5-in. rocket.

Mack Molding Co., Wayne, N. J.—plug, closing, for 155mm howitzer.

Allied Federal Screw Machine Products Co., Newark, N. J.—tracer, metal parts.

Watervliet Arsenal, Watervliet, N. Y.

Firth Sterling Steel & Carbide Corp., New York—tips, tool, carbide.

McCrosky Tool Corp., Meadville, Pa.—reamers.

Springfield Ordnance District, Springfield, Mass.

Casco Products Corp., Bridgeport, Conn.—fuze, parts.

Bruner-Ritter, Inc., Bridgeport, Conn.—booster, metal parts.

Sargent & Co., New Haven, Conn.—booster, metal parts.

Royal Typewriter Co., Hartford, Conn.—metal parts for booster.

Chase Brass & Copper Co., Inc., Waterbury, Conn.—case, cartridge, 90mm.

Engineers Specialties Div., Buffalo, N. Y.—comparators.

Vickers, Inc., Detroit—spare part for materials handling equipment.

Gilbert & Barker Mfg. Co., W. Springfield, Mass.—spare parts for fuze, setter and tooling.

Colt's Mfg. Co., Hartford, Conn.—5000 rear sight group assemblies for .50-cal. M2 heavy barrel machine gun; spare parts for gun, machine, .50 cal. M2.

Indian Motorcycle Co., Springfield, Mass.—shell, smoke, 57mm, metal parts.

Casco Products Corp., Bridgeport, Conn.,—1,100,000 screw, bottom closing, assembly, for M48 fuze.

Greenfield Tap & Die Corp., Greenfield, Mass.—threading sets.

Scovill Mfg. Co., Waterbury, Conn.—fuze, PI, metal parts assembly.

Remington Arms Co., Inc., Bridgeport, Conn.—50 million cartridges, ball, for carbine, .30 cal.

Yale & Towne Mfg. Co., Stamford, Conn.—fuze, rocket, dummy.

SIGNAL CORPS AWARDS

Signal Corps Stock Control Agency, Philadelphia

Federal Telephone & Radio Corp., Clifton, N. J.—radio sets.

S. H. Couch Co., Inc., North Quincy, Mass.—remote control equipment.

Homelite Corp., Port Chester, N. Y.—motor generator.

Cooper & Cooper, Chicago—tool equipment.

Raytheon Mfg. Co., Waltham, Mass.—radio sets, maintenance, parts.

Pioneer Gen-E-Motor Corp., Chicago—power unit.

Kellogg Switchboard & Supply Co., Chicago—ringer sets.

Teletype Corp., Chicago—teletypewriters and reperforators.

Kleinschmidt Laboratories, Inc., Deerfield, Ill.—teletypewriter sets.

Signal Corps Procurement Agency, Philadelphia

Essex Wire Corp., Newark, N. J.—cable assembly.

L. H. Terpening Co., New York—modification kit.

Western Electric Co., Inc., New York—communicating system; telephone carrier terminal.

Phelps Dodge Copper Products Corp., Habirshaw Cable & Wire Div., New York—expansion of facilities for production of field wire.

Hill Diesel Engine Corp., Lansing, Mich.—spare parts for internal combustion engine.

Dayatron Electric Corp., Poughkeepsie, N. Y.—head, recorder.

Lionel Corp., Hillside, N. J.—controls.

Minneapolis Honeywell Regulator Co., Micro-Switch Div., Freeport, Ill.—micro-switch.

Telectro Industries Corp., Long Island City, N. Y.—recorder reproducer.

Hallicrafters Co., Chicago—radio sets.

Wickes Engineering & Construction Co., Camden, N. J.—radio transmitters.

Molded Insulation Co., Philadelphia—radiosonde transmitter.

Collins Radio Co., Cedar Rapids, Iowa—radio receiver; maintenance parts.

Northern Radio Co., Inc., New York—frequency shift keyer equipment.

ARMY ENGINEERS AWARDS

Corps of Engineers, Chicago Procurement Office

International Harvester Co., Melrose Park, Ill.—tractors, field service kits.

Frank G. Hough Co., Libertyville, Ill.—tractors.

Burch Corp., Crestline, Ohio—snow plows.

Caterpillar Tractor Co., Peoria, Ill.—tractors.

Bucyrus-Erie Co., Milwaukee — rippers; scrapers.

Geo. Haiss Mfg. Co., New York—conveyors.

Barber Green Co., Aurora, Ill.—conveyors; asphalt plant.

Unit Crane & Shovel, Inc., Milwaukee—cruiser cranes.

Cleaver Brooks Co., Milwaukee — heater, asphalt, trailer mounted; spare parts.

Littleford Bros. Co., Cincinnati—tank, asphalt, steel.

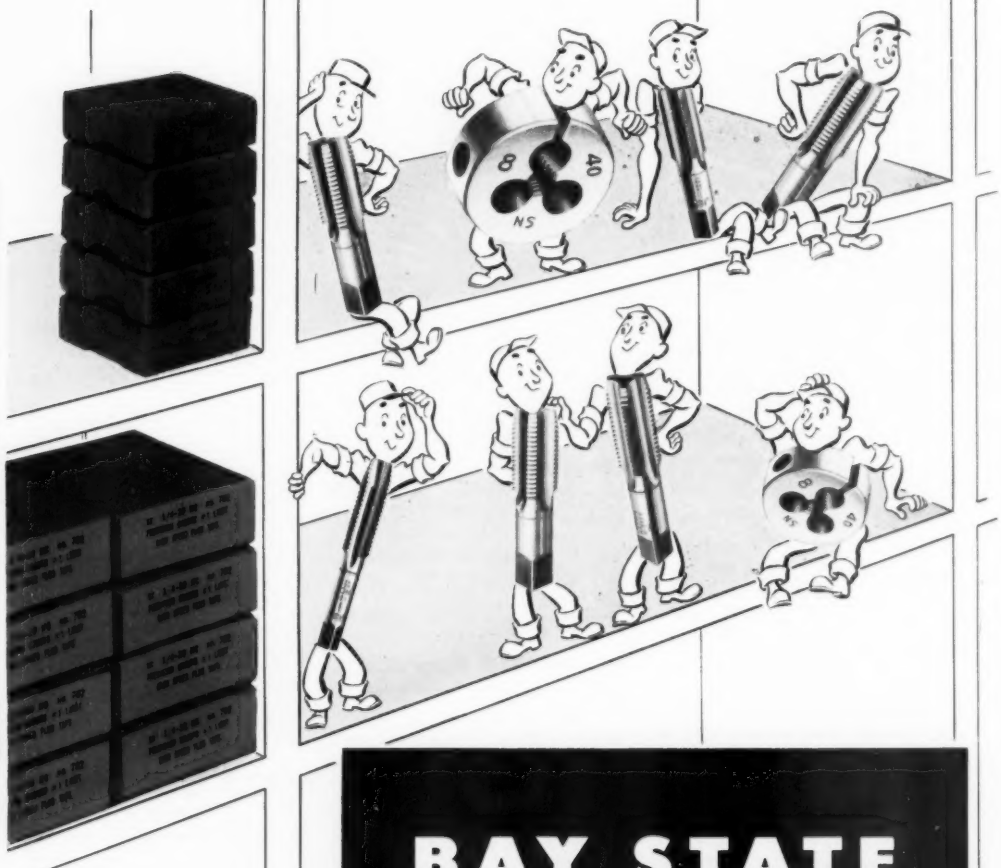
Ready Power Co., Detroit—spare parts, ready power equipment.

LaCrosse Trailer Co., LaCrosse, Wis.—spare parts.

(*Continued on page 189*)

On nearby shelves

of Industrial Supply Distributors



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TAPS & DIES

BAY STATE TAP & DIE CO., MANSFIELD, MASS.

ARMY ENGINEERS AWARDS continued

Fruehauf Trailer Co., Detroit—spare parts.
Balderson, Inc., Wamego, Kan.—spare parts.
Eidal Mfg. Co., Alburquerque, N. J.—spare parts.
D. W. Onan & Sons, Inc., Minneapolis—spare parts.
Detroit Diesel Eng. Div., General Motors Corp.—spare parts, diesel equipment.
Simpson Electric Co. Div., American Gage & Mach. Co., Chicago—spare parts.
Novo Engine Co., Lansing, Mich.—spare parts.
Fuller Mfg. Co., Kalamazoo, Mich.—spare parts.
Trackson Co., Milwaukee—spare parts.
Westinghouse Electric Corp., Chicago—spare parts.
K. D. Lemp Co., Cincinnati—spare parts.
Murphy Diesel Co., Milwaukee—spare parts.
Cummins Engine Co., Inc., Columbus, Ind.—spare parts.
United Motor Service Div., General Motors Corp., Detroit—spare parts.
Le Roi Co., Milwaukee—spare parts.
Wisconsin Motor Corp., Milwaukee—spare parts.
Warner Electric Brake & Clutch Co., S. Beloit, Wis.—spare parts.
Hughes-Keenan Corp., Delaware, Ohio—spare parts.
E. O. Etnyre Co., Oregon, Ill.—spare parts.
Lenard Co., Boston—spare parts.
Buffalo Springfield Roller Co., Springfield, Ohio—spare parts.
Minneapolis-Moline Co., Minneapolis—tractors.
Southwest Welding & Mfg. Co., Alhambra Calif.—scrapers.
Western Iron & Foundry Co., Wichita, Kans.—skullcrackers.
Gledhill Rd. Machinery Co., Galion, Ohio—snow plows.
Erie Meter Systems, Inc., Erie, Pa.—separators, gasoline and water.
Baldwin-Lima-Hamilton Corp., Lima, Ohio—spare parts.
Hercules Motors Corp., Canton, Ohio—spare parts.
Harnischfeger Corp., Milwaukee—spare parts.
Cleveland Diesel Engine Div., General Motors Corp., Cleveland—spare parts.
Youn Welding Co., Baton Rouge, La.—buckets, dragline.
C. S. Johnson Co., Champaign, Ill.—buckets, clamshell.
Galion Iron Works, Galion, Ohio—road rollers; spare parts.
J. I. Case Co., Racine, Wis.—tractors, wheel type.
McKiernan-Terry Corp., New York—pneumatic hammers.
Bay City Shovel Co., Inc., Bay City, Mich.—cranes.
Heil Co., Milwaukee—spare parts.
Electric Auto-Lite Co., Toledo—spare parts.
Osgood Co., Marion, Ohio—spare parts.
Gar-Wood Industries, Inc., Findlay, Ohio,—spare parts.
Municipal Supply Co., South Bend, Ind.,—distributors.
LeRoi Co., Milwaukee—modification kits.
Thew Shovel Co., Lorain, Ohio—cranes and attachments.

QUARTERMASTER AWARDS

Chicago Quartermaster Depot

Fairbanks Morse & Co., Chicago—scale, weighing, platform folding.
Manhattan Lighting Equip. Co., New York—scale, weighing, spring balance, circular dial.
Triumph Mfg. Co., Cincinnati—machine, mixing, vertical.
Bead Machinery Div., Standard Stoker Co., Inc., York, Pa.—machine, mixing, vertical.
Tokni-Craft, Rockton, Ill.—ice cream plant, portable; spare parts and tools.
Hyde Corp., Ft. Worth, Tex.—trailer, 2-wheel, clothing repair; trailer, 2-wheel, textile repair.
McCabe-Powers Auto Body Co.—trailer, shoe repair.
Vulcan-Hart Mfg. Co., Baltimore—range.
Washington Stove Works, Everett, Wash.—range, oil burning.
Lonergan Mfg. Co., Albion, Mich.—burner, oil stove, tent.
Steel Products Co., Inc., Savannah, Ga.—semi-trailer, 7½ ton.
Reynolds Electric Co., River Grove, Ill.—machine, mixing, vertical.
American Laundry Machinery Co., Chicago—laundry and dry cleaning equipment.
C. L. Bryant Corp., Cleveland—stoves, Yukon.
Prentiss Wabors Products Co., Wisconsin Rapids, Wis.—stoves, Yukon.
Taylor Metal Products Co., Mansfield, Ohio—spare parts & accessories kit.
Lawrence Eliot Co., Inc., Boston—automotive spare parts and accessories.
Froehlich Co., Inc., New York—automotive spare parts and accessories.
Atchison Leather Products Co., Atchison, Kan.—automotive spare parts and accessories.

NAVY AWARDS

Bureau of Ordnance, Washington 25, D.C.

Cameron Iron Works, Inc., Houston—depth charges.
Technical Instrument Co., Inc., Houston—development, design and manufacture of intervalometers.
National Can Corp., New York—fuze containers.
New Haven Clock & Watch Co., New Haven, Conn.—practice depth charges.
H. A. Sward Co., Inwood, L.I., N.Y.—arming cells for demolition equipment.
Melvian Can Co., Maspeth, N.Y.—fuze containers.

Electronic Supply Office, Great Lakes, Ill.

General Electric Co., Schenectady, N.Y.—electron tubes.
Federal Mfg. & Eng. Corp., Brooklyn, N.Y.—capacitors, variable.
Eithel-McCullough, Inc., San Bruno, Calif.—electron tubes.
National Electric Machine Shops, Inc., Silver Spring, Md.—transformers.
Electro Engineering Products Co., Inc., Chicago—armature, dynamotor, brush set, electrical contact.
Sangamo Electric Co., Springfield, Ill.—blower.
Roller Smith Co. Div., Realty & Industrial Corp., Bethlehem, Pa.—meters.

Ships Parts Control Center, Mechanisburg, Pa.

Twin Disc Clutch Co., Racine, Wis.—repair parts for diesel engines.
Babcock & Wilcox Co., New York—repair parts for boilers.
Mine Safety Appliance Co., Pittsburgh—repair parts for breathing apparatus.
Hobart Mfg. Co., Troy, Ohio—repair parts for galley equipment.
Westinghouse Electric Corp., Philadelphia—repair parts for turbines.
Clayton Mfg. Co., El Monte, Calif.—repair parts for steam generators.
General Metals Corp., Enterprise Div., San Francisco, Calif.—repair parts for diesel engines.
Union Diesel Engine Co., Oakland, Calif.—repair parts for diesel engines.
Fairbanks Morse & Co., New York—repair parts for diesel engines.
Cooper-Bessemer Corp., Mt. Vernon, Ohio—repair parts for diesel engines.
Worthington Pump & Machinery Corp., Harrison, N. J.—repair parts for pumps and turbines.
Robertshaw-Fulton Controls Co., Fulton Sylphon Div., Knoxville, Tenn.—temperature regulators and various repair parts.
Auto Engine Works, Inc., St. Paul, Minn.—repair parts for diesel engines.
Sterling Engine Co., Buffalo, N. Y.—repair parts for diesel engines.
American Locomotive Co., Schenectady, N. Y.—repair parts for diesel engines.
I-T-E Circuit Breaker Co., Philadelphia—circuit breaker elements.
Diamond Power Specialty Corp., Lancaster, Ohio—repair parts for soot blowers.
Bristol Co., Waterbury, Conn.—repair parts for diesel engines.
Cummins Engine Co., Inc., Columbus, Ind.—repair parts for diesel engines.
Allis-Chalmers Mfg. Co., Milwaukee—repair parts for motors, generators and electrical control equipment.

Philadelphia Naval Shipyard

Kollmorgan Optical Co., Bklyn., N. Y.—spare parts for submarine periscopes.
Sharples Corp., Phila, Pa.—bowl assemblies repair parts for diesel oil fuel purifier.
Electric Boat Co., Bayonne, N. J.—pump repair parts.
Edwin L. Wiegand Co., Pittsburgh, Pa.—heaters, electric submarine.
Wakefield Bearing Corp., Wakefield, Mass.—sleeve bearings.
Kingsbury Machine Works, Inc., Phila. Pa.—sleeve bearings.
Pacific Division, Bendix Aviation Corp., Burbank, Calif.—underwater log speed indicators.
General Electric Co., Phila., Pa.—motor generator set repair parts.

Naval Construction Battalion Center, Porthueneme, Calif.

Viking Mfg. Corp., Cleveland—ranges, oil and gasoline fired.
Armco Drainage & Metal Products, Inc., Los Angeles—buildings, prefab.
Stewart & Stevenson Services, Inc., Houston—diesel electric generator sets.
Caterpillar Tractor Co., Peoria, Ill.—diesel electric generator sets.
Steelcraft Mfg. Co., Rossmoyne, Ohio—buildings, metal, prefab.
Foote Co., Inc., Nunda, N. Y.—paving mixer.
Chain Belt Co., Los Angeles, Calif.—concrete mixer.
Butler Mfg. Co., Kansas City, Mo.—fuel tanks.
Worthington Pump & Machinery Corp., Los Angeles, Calif.—concrete mixer.
International Harvester Co., Los Angeles, Calif.—folding truck tops.
Cleveland Trencher Co., Cleveland, O.—gasolene engine driven ditcher.
Kwik-mix Co., Port Washington, Wisc.—concrete mixer.
Austin-Western Co., Aurora, Ill.—road grader.
Smith-Booth Usher Co., Los Angeles, Calif.—concrete mixer.
Pacific Iron & Steel Co., Los Angeles, Calif.—prefabricated metal buildings.

Bureau of Ships, Washington 25, D.C.

General Electric Co., Washington, D. C.—motors, generators.
Halicrafters Co., Chicago—radio receiving equipment.
C.G.S. Laboratories, Inc., Stamford, Conn.—transmitter, carrier telegraph.
Foster Wheeler Corp., New York—parts for economizers.
Stoddart Aircraft Radio Corp., Hollywood, Calif.—preliminary model test set radio; radio interference and field intensity measuring equipment.
Bath Iron Works Corp., Bath, Me.—shaft strut.
Gould Pumps, Inc., Seneca Falls, N. Y.—pumps.
Commercial Engineering Co., Washington, D. C.—main propulsion turbine.
Hyde Windlass Co., Bath, Me.—steering gear.
Fairbanks, Morse & Co., Chicago, Ill.—300 KW diesel engine generator sets.

(*Continued on page 190*)

subcontracting NEWS

BUREAU OF SHIPS AWARDS . . . *continued*

Nash Engineering Co., So. Norwalk, Conn.—pump, priming complete with motor, controller & priming valve.

Warren Steam Pump Co., Warren, Mass.—pump, air conditioning circulating.

Electric Boat Co., Bayonne, N. J.—25KVA motor generator set.

Bogue-Electric Mfg. Co., Paterson, N. J.—25 KVA motor generator set.

Atwood & Merril Co., Salem, Mass.—10 in. angle bronze hydraulic operated valve.

Diamond Power Specialty Corp., Lancaster, O.—utiliscope television system.

Teletype Corp., Chicago, Ill.—teletypewriter distortion test set.

Kerotest Mfg. Co., Pittsburgh, Penna.—valves plug rotary.

Continental Electric Co., Inc., Newark N. J.—motor generators.

Harvey-Wells Electronics, Inc. Southbridge, Mass.—pulse generator.

NAVY AVIATION AWARDS

Bureau of Aeronautics, Washington 25, D. C.

Radioplane Co., Van Nuys, Calif.—radio control receivers.

Beech Aircraft Corp., Wichita, Kans.—overhaul of aircraft.

General Electric Co., Schenectady, N. Y.—generators.

General Tire & Rubber Co., Jato Div., Azusa, Calif.—jato assist takeoff units.

Telephonics Corp., Huntington, L. I., N. Y.—devices suitable for air shipment of aircraft engines.

Jack & Heintz Precision Industries, Inc., Cleveland—starters.

Metal Products Div., Baltimore—propeller assemblies.

Walter Kidde & Co., Inc., Belleville, N. J.—oxygen cylinders.

Aviation Supply Office, Philadelphia

Walworth Co., New York—valves, globe composition.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.—maintenance parts for use on Pratt & Whitney engines; maintenance parts for use on starters; regulators, oxygen, for aircraft.

U. S. Rubber Co., Mishawaka, Ind.—maintenance parts for F9F aircraft.

Hydro-Aire Inc., Burbank, Calif. — valves, for use on various aircraft.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.—carburetor assembly for aircraft.

Air Associates, Inc., Teterboro, N. J.—motors, 26 volts, dc, 22 amp.

Airesearch Mfg. Co., Los Angeles—motors, 24 volts, dc.

Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y.—sheet assembly for F8F aircraft.

Cleveland Pneumatic Tool Co., Cleveland—fork and strut assemblies "M" ship.

Waukesha Motor Co., Railway Div., Waukesha, Wis. auxiliary power unit for use on ground model APU's.

Aero Supply Co., Inc., Corry, Pa.—valve, fuel selector for F9F aircraft.

Rochester Products Div., General Motors Corp., Rochester, N. Y.—maintenance parts, regulators, including shaft housing & leve assembly for aircraft.

Seth Thomas Clock Div., General Time Corp., Thomaston, Conn.—maintenance parts for clocks and chronometers.

Aerotec Corp., Greenwich, Conn.—maintenance parts for switches, valves and indicators used on aircraft.

Chandler-Evans Div., Niles-Bement-Pond Corp., West Hartford, Conn.—aircraft carburetor assembly for use on R-3350/30 W engines.

Electrical Engineering & Mfg. Co., Los Angeles—motors, for use on horizontal stabilizer actuators.

Consolidated Engineering Corp., Pasadena, Calif.—recording & measuring equipment.

AIR FORCE AWARDS

Air Material Command, Wright-Patterson AF Base, Dayton

U.S. Gauge Div., American Machine & Metals, Inc., Sellersville, Pa.—oil pressure transmitters.

Clayton Mfg. Co.,—vapor pressure cleaners.

Cleveland Pneumatic Tool Co., Cleveland—landing gear assembly.

Hedman Co., Chicago—solenoid remote gun firing.

Eicor, Inc., Chicago—generators.

Radioplane Co., Van Nuys, Calif.—rotary launcher & restrofil kits.

Technical Training Aids, Inc., Tulsa, Okla.—panel trainers.

Simmons Bros., Long Island City, N. Y.—projection printers assembly.

Houston Fearless Co., Los Angeles—processing machines.

Bell & Howell Co., Chicago—splicer assembly; cameras and accessories; misc. photo parts.

A. O. Smith Corp., Milwaukee—landing gear equipment.

Kearfott, Inc., Little Falls, N. J.—compass system assembly.

Servel, Inc., Evansville, Inc.—machinery and equipment.

Heiland Research Corp., Denver—lamp assembly.

Mastercraft Metals Co., Inc., Dayton, Ky.—sinks.

U.S. Electrical Tool Co., Cincinnati—buffers.

Ready Power Co., Detroit—power facility assembly.

Hycon Mfg. Co., Pasadena, Calif.—misc. photo parts, electronic test equipment.

Marlew Pumps, Ridgewood, N. J.—pumping kits.

Collins Radio Co., Cedar Rapids, Mich.—radio transmitters, flight computers.

McGraw Electric Co., Milwaukee, Wis.—transformers.

Addressograph Multigraph Corp., Dayton, O.—embossing machine.

Air Reduction Sales Co., Inc., N. Y., N. Y.—manifold.

Aeroproducts Div., GMC, Dayton, O.—propeller de-ring.

Bol, Ltd., N. Y., N. Y.—gun camera.

Knox Metal Products, Inc., Waynesboro, Ga.—utility trailers.

Norma-Hoffman Bearing Corp., Stamford, Conn.—roller bearings.

Lewis Engineering Co., Naugatuck, Conn.—tester assembly.

American Coleman Co., Omaha, Neb.—towing tractor.

Piasecki Helicopter Corp., Morton, Pa.—helicopter spare parts.

Pako Corp., Minneapolis, Minn.—dryers.

General Services Administration, Dallas, Texas—office equipment.

Heil Co., Milwaukee, Wisc.—fuel servicing trailer spare parts.

Century Geophysical Corp., Tulsa, Okla.—amplifier system.

Apex Machine & Tool Co., Dayton, O.—joint aircraft.

General Electric Co., W. Lynn, Mass.—engine simulator.

Pneumatic Tire Servicing Co., Huntington Park, Calif.—turbochargers.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.—indicators.

Sperry Gyroscope Corp., Great Neck, L. I., N. Y.—portable analyzer.

Gleason Works, Rochester, N. Y.—tester assembly.

W. W. Sly Mfg. Co., Cleveland, O.—blast cabinets.

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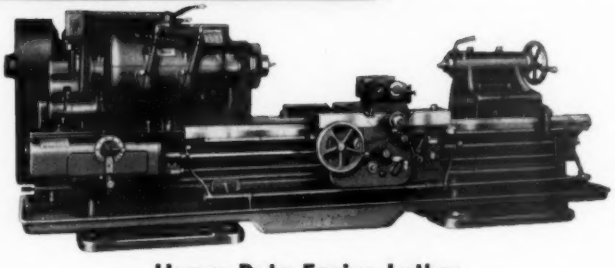

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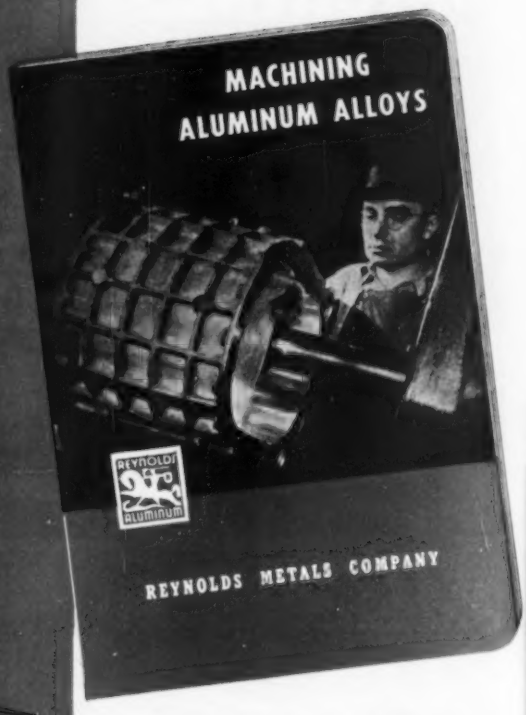

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REYNOLDS ALUMINUM

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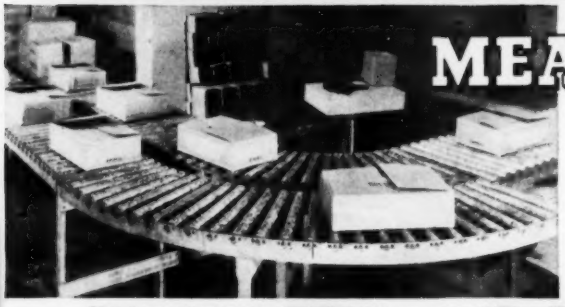

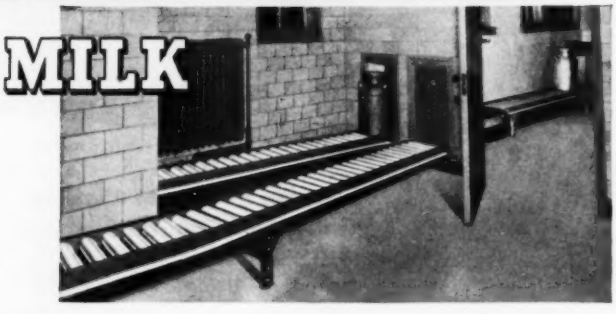

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VERTICAL LIFTS • PNEUMATIC TUBE SYSTEMS

They do not know any better and those that do are not allowed to do any better. Top management is the ONLY answer to the solution of the problem. Do they want better companies? Do they want their foremen to help save money? Do they want smooth running organizations? If the answer is yes, then they'd better start training their personnel.

Charles Townsend
West Hartford, Conn.

•

The army engineer tells us that there are five ways to get to the other side of a mountain—and that the result in each case is the same. You get to the other side of the mountain by going over it, left around it, right around it, under it, or through it.

Now, who decides which way to go? The chief—right? Well then, if a set of drawings comes into the shop, after having been checked by the Chief engineer and OK'd for production, it is up to the shop to get it out. The "how to do it" is up to Ed, who knows, or should know, the capacity of his shop and the abilities of his men.

Most new designs have bugs in them, but a well-thought-out and blueprinted idea or design is way ahead of a spontaneous idea which may occur to a toolmaker who is entrusted with the job of producing the tool as designed. What evidence do we have that the "new thought" will work better than the planned thought? If, as Ed says, time is short, why not go ahead, push the designed tool through to completion, and if the finished tool fails, then the responsibility can be placed where it belongs. If it's that bad, then the company needs a new chief engineer.

Much valuable time can be lost by dickering over new and so-called better possibilities. Red tape would probably consume more time than it would take to make the tool as designed.

There is an old saying among typesetters, which could be applied to our business by changing it from, "Follow copy, even if it goes out the window," to "Follow the blueprint, even if it goes out the window."

Henry George
Dayton, Ohio

•

Abraham Lincoln said, "You can fool some of the people all the time and all of the people some of the time but you can't fool all of the people all the time."

Human nature is much the same

Century Motors'

Unusual Freedom from Vibration
Helps Maintain Close Tolerances— With a Minimum of Rejects

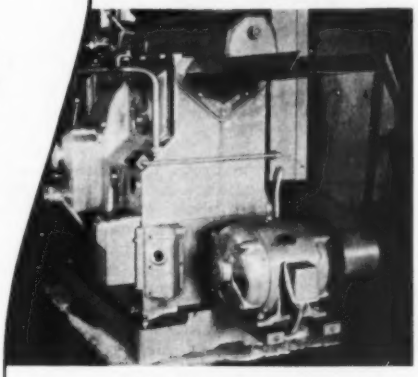
75 Horsepower Century drip proof motor on a copper tube drawing machine.

Century motors are designed to help you get the accuracy that was built into your modern production machines. They are ruggedly built, carefully machined and well balanced both mechanically and electrically. Century motors are widely known for their unusual freedom from vibration.

Century motors have wide acceptance from BIG NAME machine tool manufacturers because they mount squarely and solidly and operate with smooth, quiet precision.

You may select Century motors in: open drip proof — splash proof — or totally enclosed fan cooled construction to assure uninterrupted production against various atmospheric hazards.

The complete line of Century motors permits selection of the right motor to meet the requirements of your machines. They are built in a wide range of sizes from 1/6 to 400 horsepower. Specify Century for all your equipment.



7½ Horsepower Century drip proof motor on a crank shaper in a tool room.

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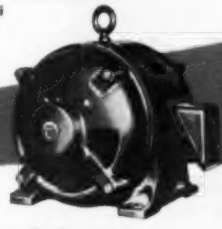

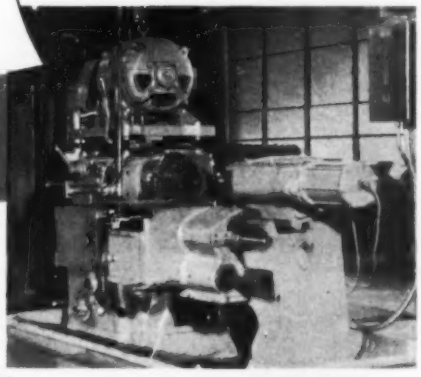

7½ Horsepower Century drip proof motor on a special production lathe.

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Prompt Service is offered by CENTURY'S National Network of more than 200 Authorized Service Stations, supervised by 28 Century Sales offices.

1. Facilities for immediate exchange of most CENTURY standard ratings of standard construction are available at CENTURY Authorized Service Stations.
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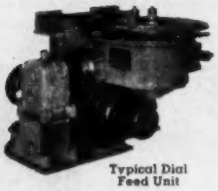
Century C MOTORS 700

Century Electric Company is celebrating its 50th Year in the electrical industry

Federal

AUTOMATIC FEEDING DEVICES BOOST PRODUCTION AS MUCH AS 400%



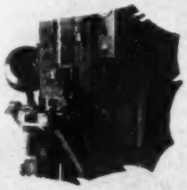
Typical Dial Feed Unit

If you are making long runs of welded parts, and are interested in increasing production and product quality, you should know about Federal Welder indexing tables, dial feeds, automatic feeding, loading and unloading devices.

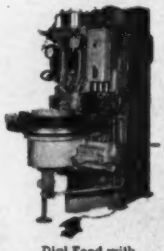
Ideal for large production runs, these Federal automatic devices pay for themselves in short order. Usually adaptable to a standard welder, they reduce the cost of the completed assembly by reducing the man hours required to perform the welding operation. It is not uncommon for an automatic feed to quadruple production over the hand fed method, and, in addition, save 50-70 percent of assembly time.

Federal automatic feeding devices lower production time by eliminating welder down time, and by eliminating fitting, clamping and other operator handling required by piece work methods.

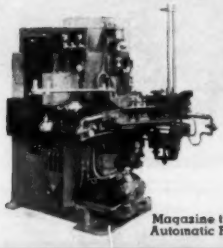
Federal automatic devices permit the welder to deliver welds of consistent high quality and uniformity. Once conditions are set they continue with every weld — eliminating the chance of human error.



Hopper, automatic feed, automatic ejection unit attached to welder



Dial Feed with automatic ejection



Magazine type Automatic Feed

Federal can furnish automatic equipment for almost any welding operation suitable for automatic feeding. For further data contact the Federal representative nearest you — or write and we will have him call on you at your convenience.

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THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

the world over, and it doesn't vary a great deal as to what status in life a man is placed, for everybody can and does make many errors, and this applies to engineering departments as well as to an individual.

Even the radius of a fillet is important, as was shown in a case a few years back when a fillet was shown on a drawing to be quite small. This fact was the cause of a casting failure, because the fillet was not of sufficient length; hence it broke under test, killing two men, and injuring three others.

A duplicate casting was made with fillets of 1¼-in. radius, and that casting stood up.

Why? Because the metal was allowed to flow to where it was needed, and so no strains were built up.

It is evident, from the talk between Al and Ed, that Chief Engineer Thompson must be a quick-tempered "blowhard"; a character who will not admit his own mistakes. That is bad.

The writer once knew a chief engineer of such a type who fired an employee named Brown (fictitious) four times.

Each time he would say, "Get to hell off this job."

The bookkeeper, who was usually at the jobs in the field, would ask the employee to come back for his money the next morning, for he knew that the discharge meant nothing.

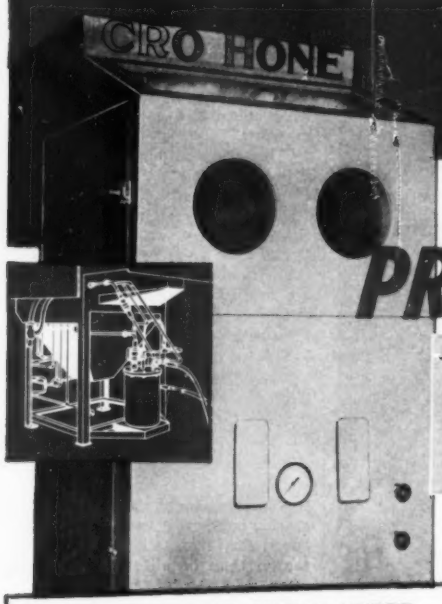
On the first occasion, Brown sat in the field office with his dough in his pocket when the chief engineer entered.

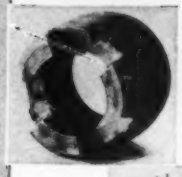
The chief glared at him and yelled, "Why in hell aren't you on the job?"

"I was workin' on an exploded view when all of a sudden . . . Bang!"

Pressure Stands for More Profitable Finishing Costs

WITH THE NEW CRO-HONE PRESSURE* BLAST



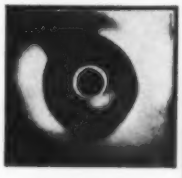


FAST, PRECISE DEBURRING OF INTRICATE PIECES OR PARTS

Here is a steel retaining set screw . . . ½" O.D. with a bad burr and feather condition, before going into the CRO-HONE PRESSURE-BLAST (to the left) . . . here is the same part after 2 seconds blasting time (to the right).

UNIFORM, ACCURATE DESCALING AND SURFACE FINISHING

Half of this 10" plastic brush handle mold was masked to show clearly the removal of the heavy heat-treat scale . . . blasting time 1 minute.



HIGH RATE OF STOCK REMOVAL

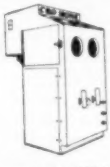
To demonstrate the exceptionally high velocity of the CRO-HONE PRESSURE-BLAST, a hole was bored in this piece of ½" plate glass in 38 seconds.

A self contained, easily installed wet-blaster, the Cro-Hone Pressure-Blast not only reduces the cost and labor involved in the cleaning and finishing of metal parts and tools . . . it actually opens up to industry an entirely new metal-working procedure with a wide range of applications.

While the technique of wet-blasting is not, in itself, new, the Cro-Hone Pressure-Blast . . . for the first time . . . employs the basic method to its greatest advantage by tremendously increasing the speed of the abrasive slurry as it is forced against the work. The fundamental formula, $E=KV^2$, ["energy, or work produced varies directly as the square of the velocity"] accounts for the effectiveness of the unit.

Despite this increase in speed and effectiveness, the unit operates at normal shop pressures of 80 to 120 p.s.i. and requires only a ½" air connection and ½" water connection.

FOUR MORE HIGH-SPEED PRODUCTION PACKAGES



THE CRO-HONE

Compact wet-blaster for general surface cleaning and finishing procedures.

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Variable speed transmission wet-blaster for high production rate work in bulk.

CRO-HONE, JR.

Small, bench model wet-blaster for occasional or experimental work.

THE CRO-HONE ROLLO-TABLE

Cro-Hone Rollo-table for the accommodation of heavy molds and dies.

*Gun nozzle speeds of conventional wet-blasting equipment have been approximately tripled.

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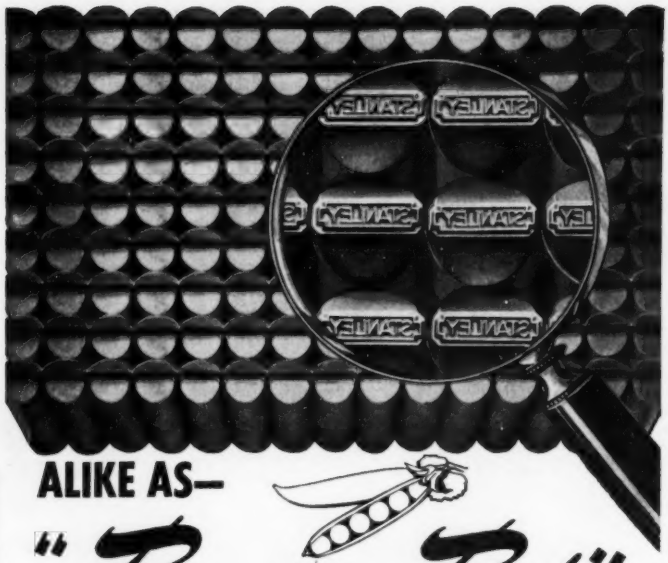

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THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
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by Parker

"Because you fired me yesterday," Brown replied.

"That doesn't make any difference; get out there on the job."

"It will cost you ten dollars a week more if I go back out there to work."

"That doesn't make any difference, either. Get out there on the job." Brown got there.

He also charged up a job of dry cleaning on the suit he was wearing at the time.

Such chiefs can't take criticism or censure, and many a conscientious employee has lost out because of the dispositions of higher-ups.

Yes, as we have said already, the higher-ups are no different than those who work on the team.

F. H. Stebbins
Worcester, N. Y.

•

Any tool engineer, or even chief engineer, ought to listen when experienced shop men talk, if for no other reason than because several brains often think better than one.

If Pierce has an idea for changing a progressive die, he probably has some good reason for making the suggestion. It's not always the theoretically highest-educated that have the best practical ideas.

The bracket Pierce considers too light has perhaps been designed by some young fellow just out of college who didn't have the experience to judge its right proportions. Many mistakes made by young engineers are diverted by such men as Pierce every day.

Ed ought to take up for consideration both these suggestions and encourage anyone in his department who has a clear head to bring their ideas to him.

In this case, Ed should first contact Thompson about the bracket to find out if he also considered it too light. If he did, a new bracket would be designed and a blueprint sent to Jones. If the progressive die just started in the shop would do, he would tell Ed so, if not, it would have to be redesigned. In both cases, Ed should hold the job until Jones has had time to investigate the matter and, at the same time, tell him about Pierce's suggestion. If Jones payed no attention to the change, he and nobody else has assumed the responsibility for any further development that may occur.

If Thompson does not feel he should change the bracket, it is up to Ed to approach Jones about Pierce's suggestion, to at least relieve himself of the responsibility he would otherwise assume.

BUILT FOR *Extra* PERFORMANCE!

FIRTHITE

Mechanigript TOOLS and INSERTS

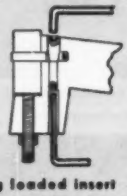
IN STOCK

Look at these OUTSTANDING FEATURES

Inserts clamped in direction of cutting forces... better support.

Open front face. No chip erosion of the toolholder.

TOP or BOTTOM insert clamping and release . . . for conventional or inverted tool mounting.



Spring loaded insert clamp for QUICK, Easy insert removal.

ALSO—Takes ALL "industry-standard" sizes of inserts. Hardened Alloy steel accessories. No shank offset on the larger sizes.

Solid, heat-treated alloy steel shank. No brazed or welded sections.

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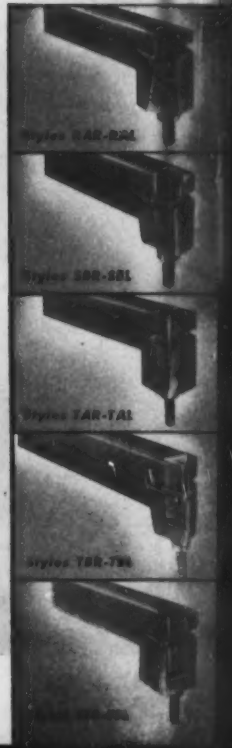

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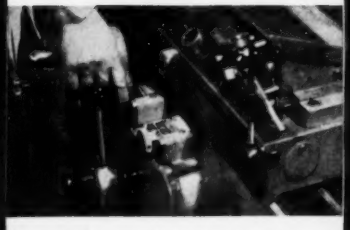
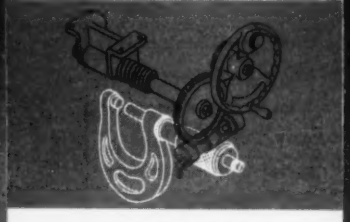
OPERATORS SAY—

"Easier to handle"



"Like a push-button radio"



"Really holds size"

"Eliminates worry of work spoilage"

MANAGEMENT SAYS—

"Outperforms earlier makes"

"Inspection costs reduced by uniform sizing performance"

Four new free catalogs describe the features of the CTU machines. No. 1787 covers the 10" semiautomatic, No. 1488 the 6" semiautomatic, No. 166 the 10" plain and No. 157 the 6" plain machine.

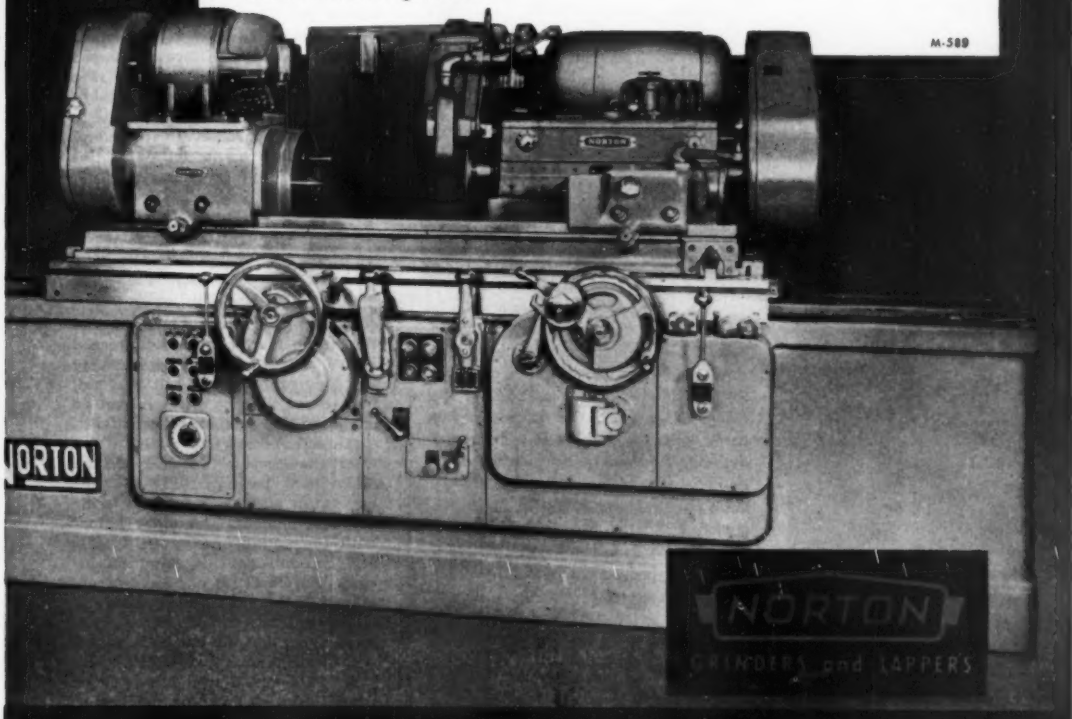
Making better products to make other products better

. . in Cylindrical Grinders

Ask the Men Who Know the Norton **TYPE CTU** Machines

MANAGEMENT men and operators combine to put their stamp of approval upon the Norton Type CTU machines for these important reasons. Outstanding are the high productive capacity, superior quality of work, minimum floor space and reduced maintenance obtained with the 6″ and 10″ Norton Type CTU cylindrical grinders. Older or less productive grinders cannot successfully compete in these times of rising material and manufacturing costs. Use of more productive equipment is the only way costs can be substantially reduced. That is why it does not pay to keep obsolete models in production and ignore the cost savings and other important advantages that may be obtained from the strictly modern and more efficient Norton grinders.

M-589



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NO. 1 PRECISION GEAR HOBBER
With built-in accuracy, and stamina beyond average requirements, the unique feature of independent selection of speed, feed, and indexing makes possible the delivery of a selected accuracy at higher speed, or a selected speed with greater accuracy than can be achieved by other machines. We are proving this daily. Complete information is offered in our free Bulletin No. H-491. Write for it now!
BULLETIN NO. H-491
THE Hamilton TOOL COMPANY
• HAMILTON • OHIO • U • S • A

Should company rules prevent Ed from asking Thompson questions in a matter of this kind, such rules should be revised to better suit modern times. If Thompson should consider Ed's approach an offense, the manager should step in and defend Ed, who has done his duty and should not be reproached. If the manager took Thompson's side, which might happen if the manager is of the weak and inefficient type, then Ed should excuse himself and keep quiet in the future. I wouldn't blame him if he did not do much to further the interest of his company. In the meantime, he should try to get another job where his efficiency would be better appreciated.

If a thing like that happens, there is probably something the matter with the whole organization; which Ed, of course, cannot change. Many managers leave it to the department heads to make their own mistakes. And perhaps Ed has had an experience of that sort, which makes him so cautious. No foreman should, however, shut his eyes if he sees something is wrong. If he cannot approach the proper authority, he can always send a signed letter, a copy of which will save him much trouble later if the matter is brought before the higher-ups.

It is better to delay a job than to finish it and have to throw it on the scrap heap. I would consider it a merit if Ed caught more mistakes like the above. It is worth while to change one part, even if several other details are affected. Why, this might even save somebody's life.

A. E. Fristedt
Stockholm, Sweden.

•

"SQUEAL OR SQUIRM"

Since this is definitely a case of first offense, I think it would be best to let the whole matter ride and proceed with business as usual. Al, knowing that one of his crew will take advantage of time on the job, can be on guard for further action of this sort and be ready to deal with it when the occasion comes up. On the other hand, perhaps Riley was just having an off day, caused by some anxious moments the night before with the young one in his family, and couldn't get his mind on his work. All of us, at one time or another, are bound to waste some of our own time; and the bosses, too, for reasons that are perfectly sound, if they are known.

For my part, I would also be on guard against any further reporting of this kind by friend Moore. How can anyone do justice to his

FROM RESULTS PRODUCED,
INDUSTRY CHOOSES . . . . .

LOGAN LATHES
FOR PRODUCTION

Results obtained through many years on work of wide variety have established the Logan Lathe as a production tool. Industry chooses and uses more Logan Lathes than ever because Logan versatility, efficiency, durability and economy pay off in profitable production.

THESE LOGAN CHARACTERISTICS WILL HELP YOUR PRODUCTION

CAPACITY . . .
With 1" collet capacity, 11" swing, 1⅜" spindle hole and center distances of 24" and 36", Logan Lathes have the size to handle substantial work.

ACCURACY . . .
Less than .0005" spindle runout 12" from the bearing . . . two V-ways and two flat ways precision ground to within .0005" variation . . . these are typical Logan Lathe construction tolerances.

VERSATILITY . . .
The Logan Lathe gives you spindle speeds of 45 to 1500 rpm with no bearing adjustment. A complete line of accessories further equips these versatile tools for every type of lathe operation.

RUGGEDNESS . . .
With its ball bearing mounted spindle, its self-lubricating bronze bearings at vital wear points, and its rugged overall construction, the Logan Lathe retains its accuracy and dependability under constant use.

ECONOMY . . .
By reducing power costs; by saving vital floor space; by quick, easy set-ups; by lasting accuracy and low maintenance; Logan Lathes put many metal turning operations on an economical and profitable basis. The saving to be realized on your original investment in Logan Lathes is a further economy well worth considering.

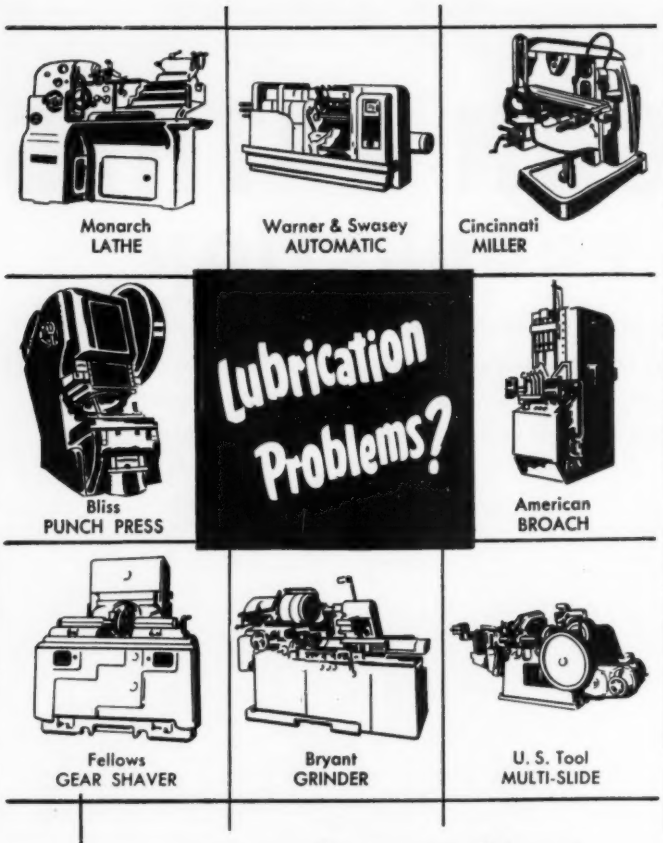
LOGAN NO. 925
11" Quick Change Gear Cabinet Lathe;
1" Collet Capacity, 1⅜" Spindle Hole,
24" and 36" Center Distances
One of the 37 Models of Logan
10" and 11" Swing Lathes

LOOK TO . . . . . Logan . . . . . FOR BETTER LATHES AND SHAPERS

FOR FULL INFORMATION, VISIT YOUR LOGAN DEALER, OR WRITE

LOGAN ENGINEERING CO.

4901 WEST LAWRENCE AVENUE • CHICAGO 30, ILLINOIS



not on these machines!

...they're all BIJUR equipped

Every one of these machines is designed for continuous production. This is made possible by the built-in Bijur lubricating system. It oils the machine during operation and reduces bearing wear by controlling oil feed *at the bearings*. In both cases, it converts down-time for maintenance into more time for production. When you buy a Bijur-lubricated machine, you're assured of built-in bearing protection.

Write for Bulletin MW

BIJUR

LUBRICATING CORPORATION

Rochelle Park • New Jersey

own work if he has time to see all that goes on around him? There's always a few who hope to advance themselves by turning in a fellow worker for some minor violation of the rules. It has been my experience that these are the ones who commit the greatest number of violations. Usually they are covering up for themselves when they have to report the doings of others. Most of today's shops have pretty accurate time sheets run on the various jobs, and with a quick check the foreman who is on his toes can tell how much time has been wasted. I am all for a man doing his every bit to hold up his end of production, but I am also human enough to realize that my men are also of the same race we call civilized people, and that there may come a day when one of them may fail to produce his quota. This should never be used as an excuse to jump to conclusions. You should find out the facts behind the temporary slump and prevent, if possible, the reoccurrence of it. It isn't difficult to trace the continual loafer. When your suspicions are aroused, throw in a few timed jobs now and then in the usual manner of routine, and find the answer for yourself in the time sheets.

Jack Bell
Bakersfield, Calif.

•

"WHAT'S NEXT" BOARD

It is the responsibility of the foreman to see that the various jobs on hand are properly scheduled and routed to the various machines and men. Good management requires that this planning be done at least one day in advance, so a minimum amount of time will be lost between setups. The idea of a "What's-Next" board raises the point of not "what you do," but "how you do it."

To know in advance just where and on which job each man is to be working is important to the foreman—especially when there is a heavy backlog on hand. To publicly display notice of "What's Next for Whom" might cause an individual to feel that he is being pushed, and he might resent it—especially if he has a certain dislike for the job ahead. Also a certain amount of preoccupation with future job assignments might interfere with the jobs in process—especially when it might be necessary to follow a "first-things-first" policy.

Would it not be better for the foreman to keep his schedule in his desk drawer and follow through in seeing that materials for the next

For those tough *Special* jobs that just have to be right...depend on

NATIONAL TOOL CO.

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

GEAR SHAPER CUTTER and HERRINGBONE GEAR CUTTER

custom-engineered to meet the exacting needs of the Gear Industry

A PARTIAL LIST OF *Special* TOOLS ENGINEERED AND MANUFACTURED BY

Gear Shaper Cutters	Milling Cutters	Chamfering Cutters
Herringbone Gear Cutters	Broaches	Rotary Gear Cutters
Ground and Unground Gear and Spline Hobs	Tungsten Carbide Tools	Circular Form Tools
Master Gears	Sprocket Cutters	Gang Cutters
	Profile Form Mills	Flat Form Tools

NATIONAL TOOL CO.
Cleveland 2, Ohio

Representatives in major industrial centers

Choice of the Leaders

RUTHMAN
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COOLANT PUMPS

The leading manufacturers of metal-cutting equipment install Ruthman Gusher Coolant Pumps on their machines because they know from experience that Gusher Coolant Pumps combine top performance with long trouble-free life.

Follow the leaders—specify Gusher Coolant Pumps on your machines. There's no priming or packing, you get copious coolant flow where you want it, when you want it, and the heavy-duty pre-lubricated ball bearings need no further attention. Write us today.

THE RUTHMAN MACHINERY CO.
1818 READING ROAD CINCINNATI, OHIO

jobs are put into position near the machines, thus indicating that work is ready and waiting for the next machine and that the machine is being pushed, not the man?

So placing the material would assure the men of plenty of work, yet leave the foreman free to assign any man to the job at a moment's notice.

Henry George
Dayton, Ohio.

•

SKILL STEALER

Stealing labor is not a fair practice, but I can't see that evidences have been presented to prove that George Ralls has committed this unpunishable crime. The fact that he left a year ago is proof that he did not ask his men to go with him to his new place.

No, the reason why some of the workers have left to work for Ralls must be looked for elsewhere. Ed is probably right when he suggests that Gibbons is a good place to work, and there may be many reasons why men quit one factory to work at another. I think Harrison should investigate the working conditions and earnings in the press department and find out how the new foreman handles his men. If Harrison is simply roaring about what has happened without making an investigation, he is not much of a superintendent. Maybe Harrison has put down rules for the new press foreman, and when they are applied they make the men angry and leave to work elsewhere. Perhaps even Ralls left for the same reason. If so, Harrison is not much of a psychologist, either.

The ethical side of the matter should not be stressed too much. If free enterprise holds freedom to do

"Well, you guys said to bring a box of chips when I came over!"

The extensions illustrated are typical of the complete Apex line. Made from high carbon, electric furnace alloy steel, Apex extensions are offered in a full range of lengths, available in 1-inch increments.
APEX Extensions
are fitted to the JOB!

• Fit the tool to the job—use Apex extensions to increase output per tool and to lower tool costs. Precision-machined to closer tolerances—as low as .002"—Apex extensions are concentric; provide positive, accurate fits on sockets and air guns . . . that means less vibration and backlash, the causes of loss of torque.

Offering any combination of female and male square, Apex can always provide direct drive from gun to work, eliminating quick-change chucks and increasing torque. Apex extensions are designed to do a better job, for a longer period of service. Catalog 19 lists the full line of Apex extensions, sockets and adapters. Write, on your company letterhead please, for your copy.

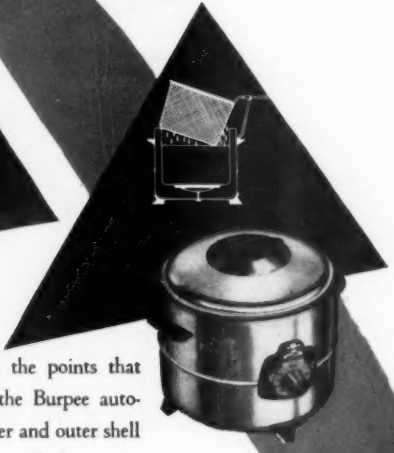
APEX sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY
1026 S. Patterson Blvd., Dayton 2, Ohio

SAFETY FRICTION TAPPING CHUCKS • VERTICAL FLOAT TAPPING CHUCKS • SELF-RELEASING AND ADJUSTABLE STUD SETTERS • POWER BITS FOR PHILLIPS, FREARSON, SLOTTED HEAD, CLUTCH HEAD, HEX HEAD AND SOCKET SCREWS • HAND DRIVERS FOR PHILLIPS, FREARSON AND CLUTCH HEAD SCREWS • AIRCRAFT AND INDUSTRIAL UNIVERSAL JOINTS • SOCKETS AND UNIVERSAL JOINT SOCKET WRENCHES.

French Fries

Make a Tasty Dish for Production Men



Round, seamless, smooth—these are the points that count with housewives when they see the Burpee automatic electric French Fryer. Inner container and outer shell are a single piece formed from a circular blank on the 4-point Clearing press in the picture.

This kind of work demands a high order of press accuracy if rejects are to be avoided. The Clearing press delivers that accuracy and holds production schedules with negligible "time out" for die maintenance or adjustment. If you make any metal product in mass production quantities it will pay you to investigate the economy and dependability of Clearing presses.

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS

CMC CLEARING

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

what one pleases within the rules of society as a precious inheritance, then, of course, nobody can deny anybody the right to work wherever they like, even if a foreman has offered them new jobs. It is one of the fundamentals of democracy for everybody to have a right to choose his place of work. I pity Al if he should be subjected to the rules he is trying to tell Ed.

No, there must have been lack of cooperation between Harrison and the worker, or between Harrison and Ralls, which made the workers feel they had better leave; and knowing Ralls to be a good foreman, they went to work for him again.

If Harrison can't keep either his foremen or men, there must be something the matter with him rather than with those under him. Evidently he has not valued his working force high enough to keep them, and the loss in skill and experience to the company should be charged to him; not to Ralls.

A. E. Fristedt
Stockholm, Sweden

Growth — Not for Gages

By FRED H. COLVIN

The advertisement of the Sheffield Corporation in *AM*, Nov. 27, 1950, recalls a conversation with the late Worcester Warner, well over 50 years ago. He went to the Philadelphia Centennial in 1876 with the Pratt & Whitney exhibit, which for the first time included a set of standard plug and ring gages. These gages had, of course, been made up well in advance of the opening date of the exhibition, and to make sure everything was in good order, Warner opened the box of gages to check the plugs and rings.

Much to his amazement, not a single plug would enter its mating ring! Growth of steel was a new experience, and artificial "aging" had probably never been thought of. As time was short, he took one pair of gages and lapped them to the desired fit. That was the only size plug and ring they took out of the case at Philadelphia, as Warner told me the story.

Many have learned a lot about making steel stable since then, but it is evidently still a problem that must be reckoned with. Incidents of this kind help remind us of the progress that has been made.

Saves 60%

In Packaging Time with Angier Paper that

Stops Rust with Vapor

40 hours a month instead of 100! Yet, this 60% cut in packaging time is only part of the savings.

Now that Whitin — big name in textile machinery — has adopted Angier VPI* Wrap, slushing of parts with grease is not necessary. These rollers, for example, are simply packed in boxes lined with VPI Wrap. Inside these boxes, Angier's amazing paper gives off a vapor that *prevents corrosion*. Now rollers arrive at the mills rust-free and clean — ready to use. "Cleaning" time saved is 1 hour per box — an average of 400 hours saved a month.

To simplify your shipping or storing of metal products . . . to *eliminate* "cleaning" costs, write now for "VPI Booklet."

Angier Corporation — Framingham 6, Mass.

Representatives and Distributors in Principal Cities

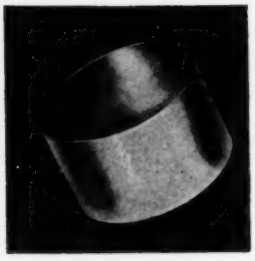
*Reg. U. S. Pat. Off. Vapor rust preventive

Slushing took 15 minutes

Now 6 minutes does it with Angier VPI Wrap

Industrial Protective Papers

Since 1895



This one is ordinary drawing brass

This one is "Formbrite"

And here's the difference

Formbrite is a trade mark of The American Brass Company designating copper-base alloys of exceptionally fine grain, combining unusual polishing characteristics with good strength and hardness, plus excellent ductility.

Now let's take 'em one by one. Formbrite is produced in sheet, strip, rod, wire and seamless tubes in most of the copper-zinc alloys. The process is applicable to practically any copper-base metal.

Its superfine grain is the result of special rolling or drawing and annealing techniques.

Formbrite in sheet and strip form is an excellent pressroom metal. It costs no more than ordinary drawing brass — yet it is harder, stronger and much more resistant to scratching and abrasion.

Despite its strength and "springiness," the ductility of Formbrite in deep-drawing operations will amaze you.

And here's the payoff: Parts made of Formbrite polish so easily and so quickly that often only a color buff is needed for plating.

Skeptical? Of course! So let's prove it. Write for the two cupped samples illustrated above in full size. Compare the finish, then try them out, side by side, on your own buffing or polishing wheels.

Address The American Brass Company, General Offices, Waterbury 20, Connecticut. 5100

the name to remember in

COPPER·BRASS·BRONZE

AXELSON

First Choice

IN HEAVY-DUTY ENGINE LATHES

Axelson lathes produce more work of higher quality with fewer rejects at lower unit costs. Long experience of users proves it pays to choose Axelson — that's why Axelson is always first choice.

DEPENDABLE FOR OVER A THIRD OF A CENTURY

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

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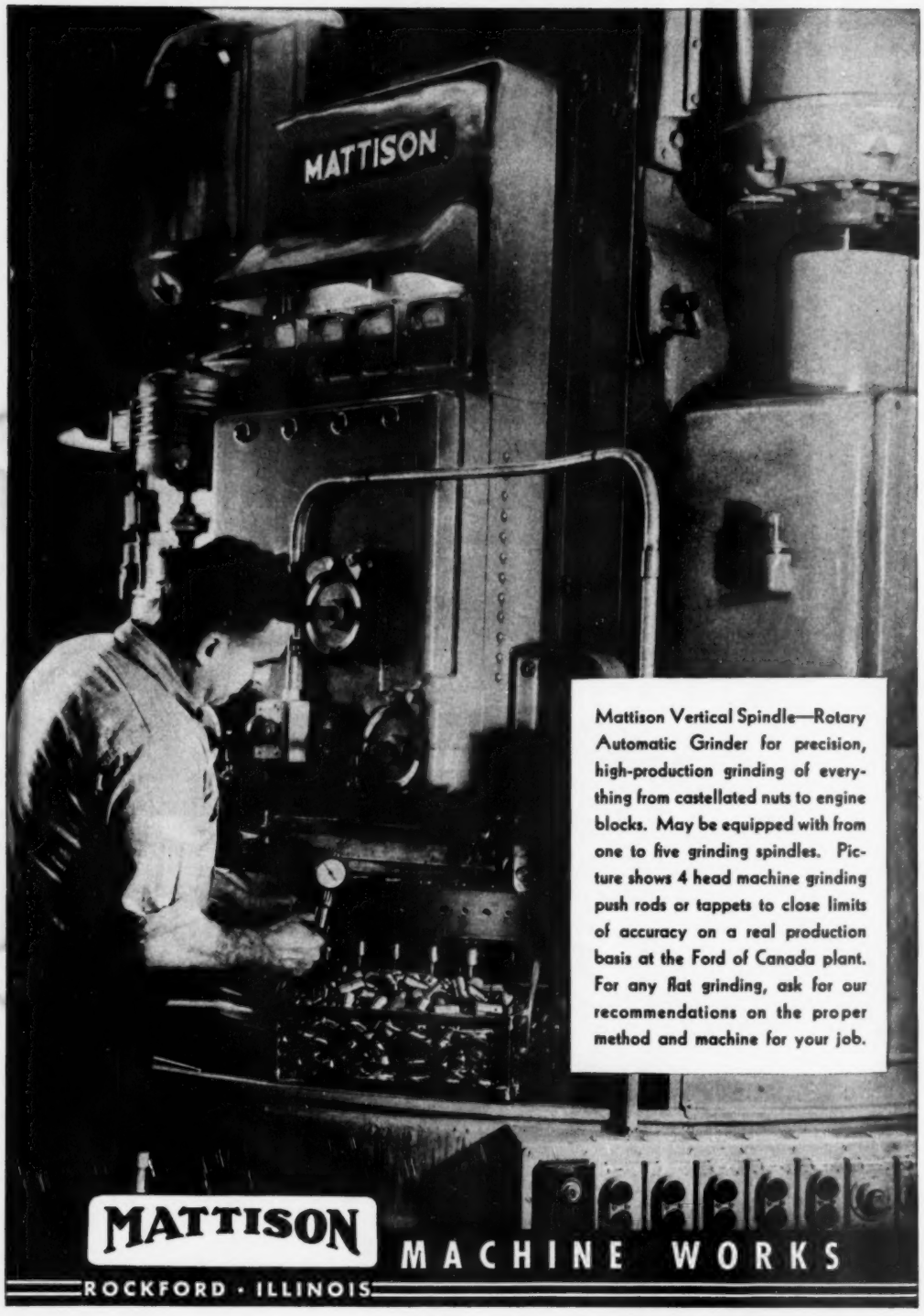
Los Angeles 58 - New York City 7 - St. Louis 16

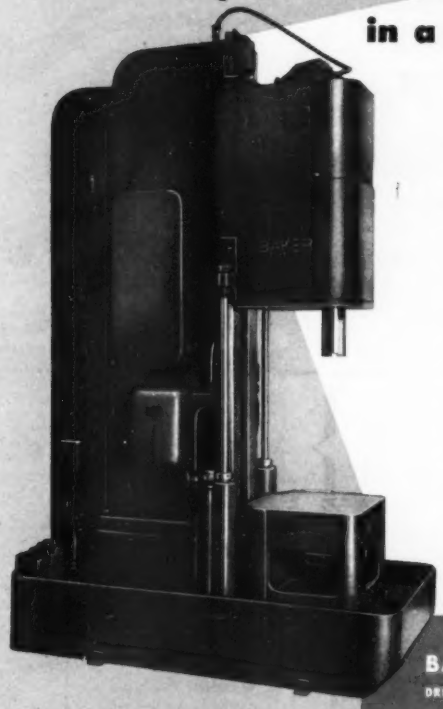
Authorized Distributors in All Principal Industrial Centers


MATTISON
Mattison Vertical Spindle—Rotary Automatic Grinder for precision, high-production grinding of everything from castellated nuts to engine blocks. May be equipped with from one to five grinding spindles. Picture shows 4 head machine grinding push rods or tappets to close limits of accuracy on a real production basis at the Ford of Canada plant. For any flat grinding, ask for our recommendations on the proper method and machine for your job.
MATTISON
MACHINE WORKS
ROCKFORD · ILLINOIS

BAKER

The Versatile BAKER 36HO DRILL...

provides increased productivity in a multitude of applications!

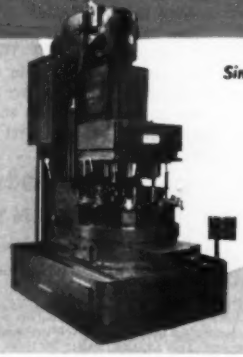


The standard Baker 36HO Heavy Duty Vertical Hydraulic Drill may be adapted to a multitude of multiple or single spindle drilling, boring, counterboring, spot facing or reaming operations. Provision for pick-off speed changeovers gives extreme flexibility of spindle speeds. The machine is of hydraulic saddle type feed and may be furnished with either standard plain table or indexing table with up to six indexing stations. Ample capacity is provided to drive one 5 inch diameter High Speed twist drill, drilling from solid in SAE-1035 steel. Write Baker concerning your specific job problem.

BAKER BROTHERS, INC., Toledo, Ohio

DRILLING . . . TAPPING . . . KEYSEATING and CONTOUR GRINDING MACHINES

Above example shows Baker 36HO as adapted for drilling wrench bodies for a leading manufacturer of crescent wrenches. Estimated production rate is 103 parts per hour at 100% efficiency. Machine is easily converted for operations on varying sizes of wrenches.



Since 1867...

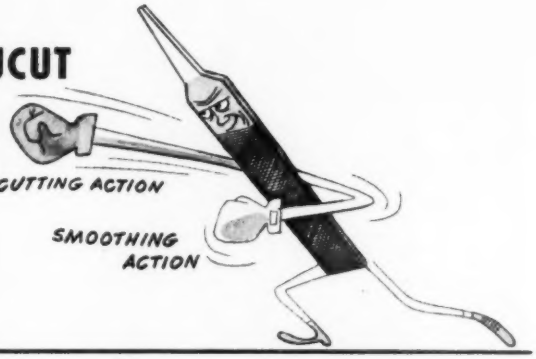
HELLER

NUCUT WAVY TEETH FILE

GOOD TOOLS SINCE 1836

Cash in on the file with the WHITE TANG

Only a NUCUT gives you "one-two" filing



1. CUTTING ACTION
2. SMOOTHING ACTION

At every stroke

HERE'S another superiority of the NUCUT "Wavy-Teeth" design. This patented feature provides the file with two sets of teeth—both in the same cutting plane. One set, the coarse teeth, cuts deep, clean, true. The other set, the fine teeth, leaves the surface smooth. Both cutting actions take place at the same time—just as if two files were working instead of one.

Your industrial distributor will gladly tell you what NUCUT "Wavy-Tooth" filing can mean to you in the way of faster cutting and smoother finishing at lower cost. He will also suggest sizes, shapes, cuts that will meet your needs best.

HELLER BROTHERS COMPANY

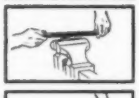
America's Oldest File Manufacturer

Newcomerstown, Ohio

Select right file for job

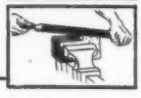
Files come in many different sizes, shapes, cuts and types. So, make sure you select the right file for the job.

WRONG: Don't use a coarse file on fine work.



RIGHT: Fine work requires a fine file.

WRONG: Don't use a fine file on coarse, heavy work.



RIGHT: Coarse work should be handled with a coarse file.

CONTACT YOUR INDUSTRIAL DISTRIBUTOR for our FULL LINE of American Pattern, Swiss Pattern, Milled Curved-Tooth and Rotary Files, Rasps, Machinists' and Carpenters' Hammers, Blacksmiths' and Farriers' Tools, Bricklayers' and Plasterers' Trowels, Craftmaster Scrapers, Chisels, Punches, Masterenches and other quality tools.

Enduro®

TAKES A "BITE" OUT OF HIGH MACHINING COSTS

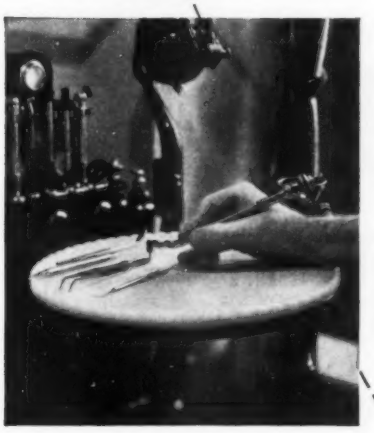
● ENDURO Stainless Steel takes a shine to dentists.

In dental hand-pieces—precisely machined from ENDURO forgings—it retains its bright shining lustre despite day-after-day sterilizing. ENDURO instruments are sanitary; free from rust, corrosion and oxidation; tough and long-lasting.

ENDURO responds uniformly to forging—and, as these intricate parts indicate, is readily machinable.

In addition, ENDURO Cold Finished Bars—processed by Republic's Union Drawn Steel Division—provide close tolerances, accuracy of section, uniform soundness and fine surface finish. Two grades are approximately 90% as machinable as Bessemer screw stock. All these qualities combine to hold unit costs and reject losses for stainless steel parts to lowest possible levels.

Republic metallurgists and machining technicians are ready now to help you take large "bites" out of high machining costs through the proper application of ENDURO free-machining bars—both hot rolled and cold drawn. Write:



REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

FOR TOP STEEL PRODUCTION...keep your scrap moving to the mills. Call your scrap dealer today.

Republic ENDURO® FREE-MACHINING STAINLESS STEEL

REPUBLIC STEEL

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

IT'S A

Mac-it

PRONOUNCED "MACK-IT"

Mac-it ⅜" x 2½" Hollow Set Screws have grip of more than 17,000 pounds.

Built for Strength!

For the toughest kind of fastening jobs, the complete Mac-it line of heat-treated, alloy steel screws will give you the strength you need *where you need it!*

Mac-it's 38 years' experience in the manufacture of these top-quality fasteners is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada.

Other Mac-it products include:

Hollow Lock Screws
Socket Head Cap Screws
Stripper Bolts
Hollow Pipe Plugs
Socket Screw Keys
Square Head Set Screws
Hexagon Head Cap Screws
. . . and many others

Marketed Nationally Since 1913 by
STRONG, CARLISLE & HAMMOND COMPANY
Cleveland 13, Ohio
Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

LUBRICATION ECONOMY

"LUBRIPLATE No. 630-AA is Practically a Universal Lubricant"

The Spokane Portland Cement Company of Irvin, Washington writes, "With the introduction of LUBRIPLATE No. 630-AA we reduced the number of lubricants we were using from ten to two. LUBRIPLATE No. 630-AA might almost be considered a *UNIVERSAL LUBRICANT*".

1. LUBRIPLATE reduces friction and wear
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Write today for case histories of savings made through the use of LUBRIPLATE in your industry.

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save handling—
speed production

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ELECTROLIFT
WORM DRIVE HOIST

Here's a one-man hoist that moves loads up to 6 tons smoothly, quietly, quickly, safely and economically. With the savings in handling and speed-up of production, ElectroLift easily pays for itself.

There's a model for each of your needs. Just call your ElectroLift representative listed in the classified telephone directory. Or write to:

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HOISTS

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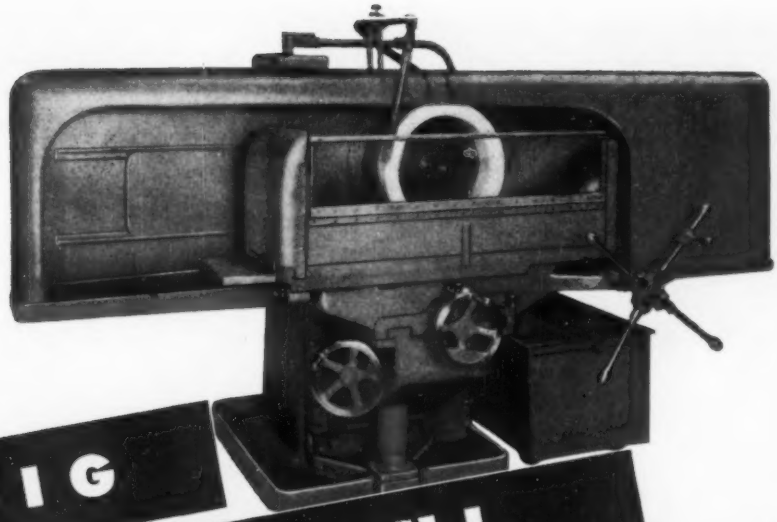

BIG POWERFUL PRODUCTIVE

ABRASIVE 18" FACE GRINDER

Put face grinding work on the machine that's specially built to take it — the Abrasive 18" Face Grinder. It's big, rugged, and powerful. The 18" wheel, with its 15 HP Motorized Spindle, "eats" through the toughest jobs: castings, auto body dies, plastics dies, fire brick, ceramics, forging dies, and any other work where flat, square surfaces are required. Set up is fast and easy. Hand feeds eliminate time-consuming adjustments — help speed the production of short runs and one-of-a-kind jobs. Use the 18" Face Grinder for snagging, heavy cuts, or accurate fine finishing. Write today for complete details and price information. ABRASIVE MACHINE TOOL CO., 8 Dunellen Road, East Providence 14, Rhode Island.

Important 18" Face Grinder Features:

Work Table Surface: 13" x 36"

Motorized Spindle: Extra-heavy design with pre-loaded ball bearings; built-in 15 HP 900 R.P.M. motor

Wheel Size: 18" diam., mounted steelback

Feeds: All hand feeds — transv. 3½"; vert. 7¼"; long. 24"

Standard Equipment: Complete wet grinding attachment with 60 gal. tank, motorized pump, unique table water guards, wrenches, etc.

Net weight: 3900 lbs.

ABRASIVE

ACCURACY BOOSTS PRODUCTION

Abrasive Quality is Reflected in the Finish of Your Product

ON DISPLAY FOR THE FIRST TIME AT THE CANADIAN INTERNATIONAL TRADE FAIR - TORONTO
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INDUSTRY BUILDING
WALES
Introducing
WALES
Drilling Machines
After 5 Years of Continuous Use in our Plant

for
PRECISION LOCATING, DRILLING AND REAMING OF HOLES

For the first time, after 5 years of using these Wales designed, engineered and manufactured Drilling Machines in our own plant, they are now introduced to the thousands of manufacturers, who like ourselves, require *precision* locating, drilling and reaming of holes in material of practically any length and up to 36" wide. **There is no other drilling machine or jig borer like it.** It fills a definite need.

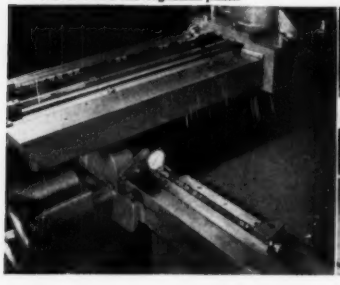
Accuracy is the primary consideration in building this exclusive, specially designed and ruggedly constructed Wales Drilling Machine which combines simplicity of operation, easier locating and faster production.

Conveniently located built-in 1/32" scales and dial-type gages calibrated in ten thousandths of an inch, used in conjunction with precision end measures, accurately locate the drill head and slide rail.

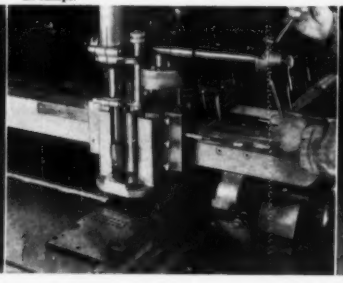
Have the complete story of this Wales Drilling Machine at your finger-tips by writing for the NEW fully-illustrated, functionally-colored Catalog D M *today.*

WALES-STRIPPIT CORPORATION
GEORGE F. WALES, *Chairman*
373 **PAYNE AVE., NORTH TONAWANDA, N. Y.**
(Between Buffalo and Niagara Falls)
WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO
Specialists in Punching and Notching Equipment

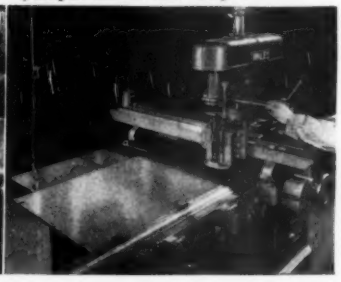
LOCATING...Holes are located by placing end measures in V-grooves on bridge and slide rail. Two speed gearing on both front-to-back and right-to-left settings provide rapid traverse for rough positioning and slow speed for "zeroing in". Air locking clamps are provided for rigid positioning on both horizontal and longitudinal planes.



DRILLING...Showing typical small template being drilled with drill head assembly and slide rail locked in position by air clamps.



REAMING...Showing hole in large template being reamed by simply interchanging the drill and bushing with corresponding size reamer and reamer bushing.



Steel saved civilization at Augsburg

FOR 2000 years, the western world has survived vast waves of Asiatic invaders who threatened to destroy it. Repeatedly, the fate of civilization and Christianity has seemed to hang on the outcome of a single battle.

Such a decisive action was fought at Augsburg, South Germany, in 955 A.D. Swarming out of Asia, savage Magyars overran the rich Danube Valley. They ravaged the prosperous lands of Germany, Italy and France. At last, under Otto, King of Saxony, the armored Knights of Christendom rallied. They faced a hundred thousand fierce foes. The battle raged all day. Thousands were slain. At last the tide turned and the Magyars fled. For three days the Knights pursued the scattered enemy, killing or capturing thousands more. Symbolic of the west's predominance in weapons and armor of iron and steel, victory was credited to King Otto's iron-tipped Holy Lance.

Augsburg ended the Magyars' attempts to conquer Europe. They settled down to peaceful living in their valley and within 50 years accepted Christianity. Again, history demonstrated the truism that no people or alliance can establish supremacy unless it first predominates in the production and use of iron and steel.

It is reassuring that America produces twice as much steel as the rest of the world combined. America has the steel to win. We will use enough of it to protect our leadership of a free Christian world.

Scrap Metal is Critical Again

The Youngstown Sheet and Tube Company

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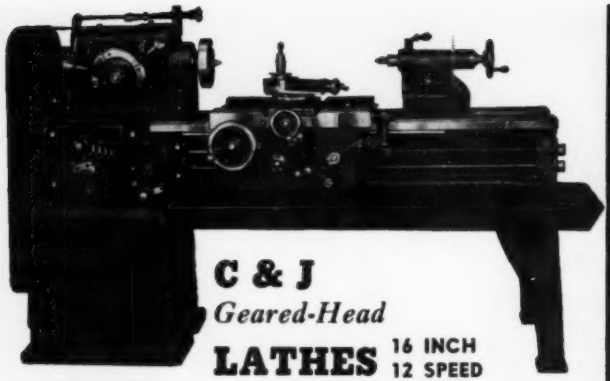
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.



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ONLY ONE MODEL • ONLY ONE SIZE

FOR HIGH GRADE PRACTICAL GENERAL SERVICE

- Tooled and equipped for efficient production
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- Feed provided by separate rod—lead screw is used only for thread chasing

Complete regular equipment includes thread indicator.

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THE JOHNSON No. 1019
SOFT METAL MELTING FURNACE
Capacity — 1000 lbs. lead

A very efficient and economical furnace for melting lead, tin, zinc, pot metal, type metal, aluminum, etc. No blower required. Nine speedy JOHNSON direct jet bunsen burners deliver pot temperatures up to 1400° F. Assure quick recovery after reloading. Burners are equipped with separate shut-off valves permitting use of only as much gas as required to maintain melting temperatures. Durable construction. Heavily insulated to retain heat and reduce operating costs. Complete with removable cast iron pot and lifting hooks. Available with automatic temperature control at extra cost.

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JOHNSON Soft-Metal Melting Furnaces are also available in smaller sizes. Write for complete catalog.

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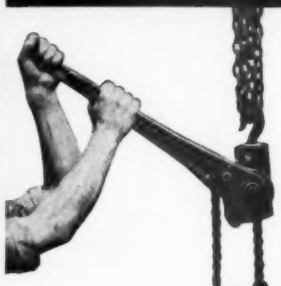
SAFETY-PULL RATCHET LEVER HOIST



MANPOWER BOOSTER

. . that's yours for keeps

Meet the increasing demand on available manpower with Coffing Safety-Pull Hoists. Here are mechanical muscles that are bought, not hired — and they're yours for keeps. With a Safety-Pull to relieve the burden of countless lifting, pulling jobs, more skilled effort is applied where it pays—in production.

Safety-Pulls work efficiently any place — indoors or out, vertically or horizontally. To assure long life, to protect your men and materials, each is factory tested at 100 percent overload. Start now to get the most from available manpower by enlisting the help of dependable Coffing Safety-Pull Ratchet Lever Hoists. Nine sizes with capacities from 1,500 to 30,000 lb. Write for Bulletin AM5SP.

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Quik-Lift Electric Hoists • Hoist-Alls Mighty-Midget Pullers • Spur-Geared Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys

Hole Location Practices

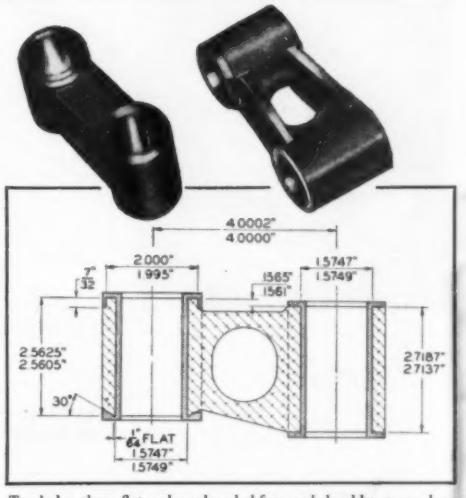
Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc., 738 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

JIG BORING CUTS Production Time 90%

It took 3½ hours to machine each of these aluminum-alloy supporting arms, used on our Moore Panto-Crush Wheel Dresser, on a boring mill. Now—on our No. 2 Jig Borer—it takes only 22 minutes per piece for lots of 100—a time saving of 90%. Hole diameters and between-centers dimensions are held to 0.0002" to insure extreme accuracy between pivot points in the wheel dresser and allow the installation of precision bearings in the holes. Read the job details at the right.

Moore Jig Borers are being used more and more on short-run production of precision work—boring, drilling, reaming and inspecting precisely located and machined holes in production parts, as well as in dies, jigs and other tools.

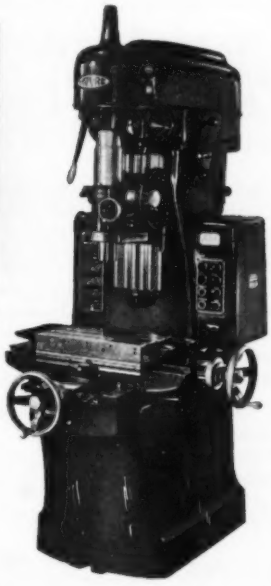
Write today for our new 24-page catalog, containing other examples of time- and cost-cutting Jig Borer operations.



Two holes, three flat and one beveled face and shoulder on one boss (the areas crosshatched in drawing) are all machined on the Jig Borer—in only 22 minutes.

Oper. No.	Operation Name	R.P.M.	Feed	Min.	Sec.
1	Load and mill ribs — Single Point fly cutter	1000	H	1	00
2	Set Up and rough bore — two holes	2000	.0015	2	10
3	Rough face two top surfaces Single Point fly cutter — Remove part to cool —	1000	H	1	35
4	Load and second rough bore two holes	2000	.003	1	50
5	Finish bore two holes	2000	.0015	2	40
6	Check two holes for size			1	00
7	Rough and finish 30° bevel	800	H	3	00
8	Rough and finish one bottom face	800	H	1	00
9	Finish face two top surfaces Out-feed chuck	800	.0025	4	35
10	Rough and finish 2" diameter shoulder	400	H	3	00
	TOTAL TIME			**21**	**50**

Checking hole size—held to 0.0002". Simple holding fixture provides both boring and milling positions.



No. 2 MOORE JIG BORER

Many examples of jig-boring and jig-grinding practices. 448 pages, 400 illustrations. 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Available at special price of $3 in U.S.A., $3.50 elsewhere. Send check or money order to Moore Special Tool Co., Inc., Bridgeport, Conn.

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SOLID STEEL COLLARS
with
UNBRAKO
Self-Locking
HOLLOW SET SCREWS

Used Profitably...

by manufacturers of such widely diversified products as *lawn mowers, food machinery, textile machinery, juke boxes, snow plows, conveyors, air compressors, agricultural machinery, electric fans, bottling machines,* and dozens of others.

Precision machined from solid bar stock in 42 stock sizes for shafts from 3/16" to 3" diameters inclusive.

Write for prices and name of your nearest distributor.

—SPS—

STANDARD PRESSED STEEL CO.

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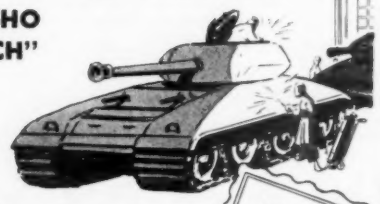
"FOR THE MAN WHO CARRIES THE TORCH"



MODEL W-46

The Weldit Model W-46 Welding Torch with the built-in automatic gas saver will give you an average gas saving per operator of $4.80 per day and will increase your production up to 148%.

The Weldit Weldimatic Torch eliminates idle flame danger. It is rugged, speedy, light, compact and safe.

The control lever of the Weldit Weldimatic Torch automatically shuts off welding flame when the operator loosens his grip on the handle. Saves fuel between welds.

WRITE FOR CIRCULAR NO. 3

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How to read with your eyes open for business

Read the ads! Every issue of this magazine contains ads that offer valuable services and useful products by which your business may be run more profitably.

The time it takes to read all the ads is time well spent. One ad alone can pay off – by informing you of new developments and new sources of supply, by helping you do a more efficient job. For example, you may locate one machine that will cut your production costs, or step up your output. Or you may discover that the equipment you've been waiting for is now available.

This magazine displays more ideas and merchandise than a trade exposition. Make every issue your buyer's guide. Read the ads as well as the articles. That's reading with your eyes open for business.

HEADQUARTERS FOR BUSINESS INFORMATION

McGRAW-HILL publications

F-22

Every Second the Clock Ticks Over $5 in Productive Time is Lost from Industrial Eye Accidents!

You Can Prevent 98% of these Accidents with Safety Goggles averaging $2.30 in cost

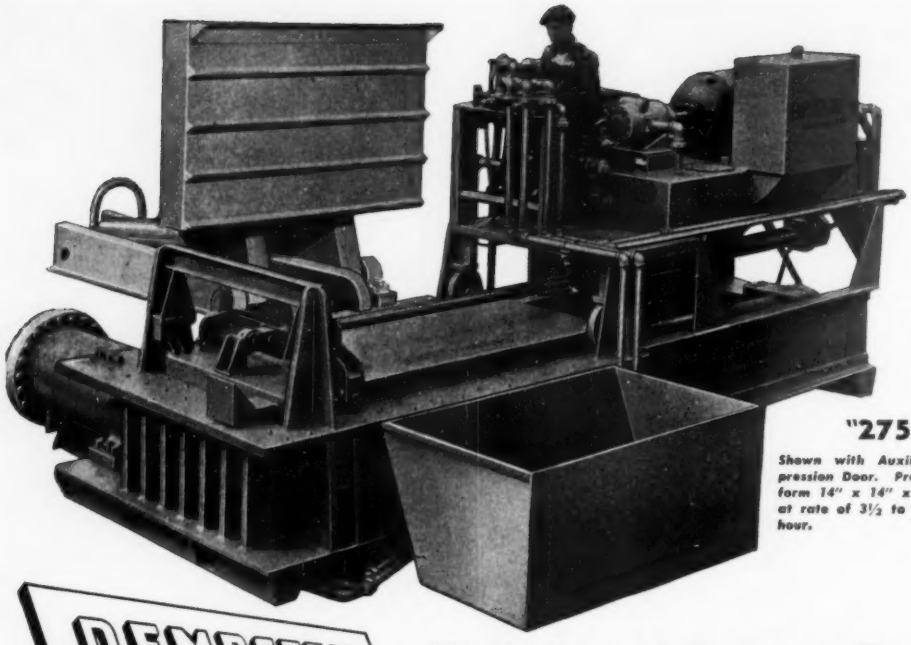
The annual cost of industrial eye accidents in *lost productive* time alone is estimated at $160,000,000—or about $5 every second the clock ticks. In lost man power this represents the equivalent of 55,000 skilled workers who could be added to the productive work force each year if Eye Protection Programs were installed universally.

With skilled workers becoming increasingly short, it will pay you to look into the labor conservation and money-saving opportunities that an AO Eye Protection Program can provide. Your AO Safety Representative can show you case history after case history in your own or allied industries where such a program has paid off in *greater output* and *lowered costs*. Ask him to call.

FACTS TO REMEMBER: Industrial eye injuries cost over $5 per employed worker per year — with compensation averaging $328 per injured man even in the low-cost year of 1938.

American Optical Company
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



"275"

Shown with Auxiliary Compression Door. Produces uniform 14" x 14" x 22" bales at rate of 3½ to 4 tons per hour.

DEMPSTER BALESTER

TRADE MARK REG

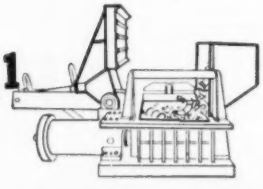
High-Speed Presses Boost Scrap Metal Handling Profits

The high-speed 275 Dempster-Balester, producing bales at the rate of 3½ to 4 tons per hour, is making scrap metal handling more profitable than ever before. With its simple construction and two ram design, the machine is easy to install . . . economical to operate. The hydraulically operated Auxiliary Compression Door compresses heaped scrap into the charging box with a 45 ton force. Users report a conservative 25% increase in production . . . with a baling crew of only two men . . . plus faster, more economical operation with the compression door. The hydraulically actuated Skip-Pan Loader, another cost-cutter, is standard equipment on all models. This invaluable feature permits preparation of a new full charge while press is baling. Illustrated below is the 1-2-3 production punch of a Dempster-Balester with Auxiliary Compression Door and Skip-Pan Loader. Write today to J. G. Walden for completely illustrated folders on the Dempster-Balesters, Models 275, 600 and 128. All products of Dempster Brothers, Inc.

The "600"

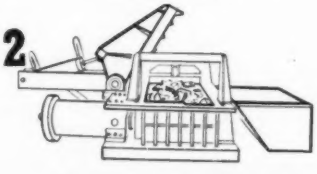
The Dempster-Balester "600" is a top production machine. It turns out scrap metal bales at the rate of 6 to 7½ tons per hour. It produces a uniform high density bale that measures approximately 16 inches by 18 inches by 35 inches, ranging in weight from 600 to 1,000 lbs. each.

1



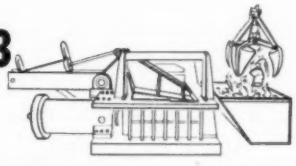
Skip-Pan Loader dumps scrap metal into charging box. Auxiliary Compression Door is in "up" position ready for immediate action once operator touches hydraulic controls.

2



Skip-Pan returns to loading position as Auxiliary Compression Door begins its "one stroke" compressing operation.

3



Door compresses scrap, permitting charging box door to be closed without further arranging. During baling cycle Skip-Pan is reloaded and charge dumped into box as soon as bale is ejected.

DEMPSTER BROTHERS, 451 Dempster Bldg., Knoxville 17, Tenn.

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LONG SLIDE *Precision* POWER PRESSES

Thanks to their long slide for accurate guiding—V & O Precision Power Presses give you longer die life than ever before experienced. Ask your V & O sales engineer to tell you more about this exclusive V & O feature, and to acquaint you with the many production advantages and economies, which V & O Precision Power Presses afford in the blanking, drawing, forming and perforating of all types of parts.

THE V & O PRESS COMPANY
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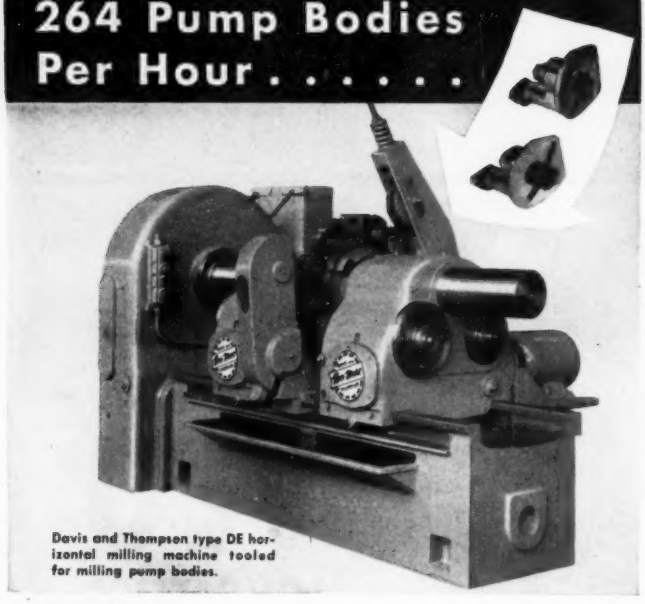
Builders of Precision
POWER PRESSES and FEEDS
Since 1889 **HUDSON, N.Y.**

264 Pump Bodies Per Hour . . . . . .



Davis and Thompson type DE horizontal milling machine tooled for milling pump bodies.

1-A Standard Horizontal Milling Machine

Oil pump bodies requiring high degree of finish and high production are rough and finish milled on both sides simultaneously with this Davis and Thompson type DE milling machine. Production is 264 pieces per hour.

Patented Angular Spindle Adjustment Allows "Toe Cutting"—Maintains Fine Finish at High Production

The finishing spindle is provided with an exclusive D&T design which allows angular adjustment. This in turn results in "toe-cutting" and eliminates "drag" of the cutter over the finished surface. Both roughing and finishing spindles have micrometer endwise adjustment.

A Basically Standard Machine Employing Roto-Matic Principle For High Production Special Milling

Like all D&T machines this model DE is designed for long life and trouble-free operation. Each head has independent drive. There is backleash take up to mandrel. Anti-friction bearings throughout. Rapid traverse between cuts can be incorporated.

Free Data will be furnished upon request.

DAVIS and THOMPSON Roto-Matic

Davis & Thompson Company

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BOSTON UNIVERSAL ANGLE PLATE

A Precision Tool that Holds Work at Any Desired Angle.

Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

Made in several stock sizes.

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US **AUTOMATIC BOX MACHINERY CO., Inc.**

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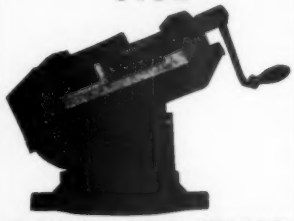
Let the *Master Multi-Swivel* VISE



SAVE YOU TIME

on intricate, angular set-ups

Fully universal, 3 swivels simplify the setting of compound angles. Parts are interchangeable. Can be used as a plain flanged vise, swivel vise, and multi-swivel vise.

OPTIONAL ACCESSORY

Platen, interchangeable with vise. Increases capacity of unit. Uses: as plain platen, multi-swivel platen.

Master Multi-Swivel Vises and accessories are used in machine shops throughout the world. For further information write

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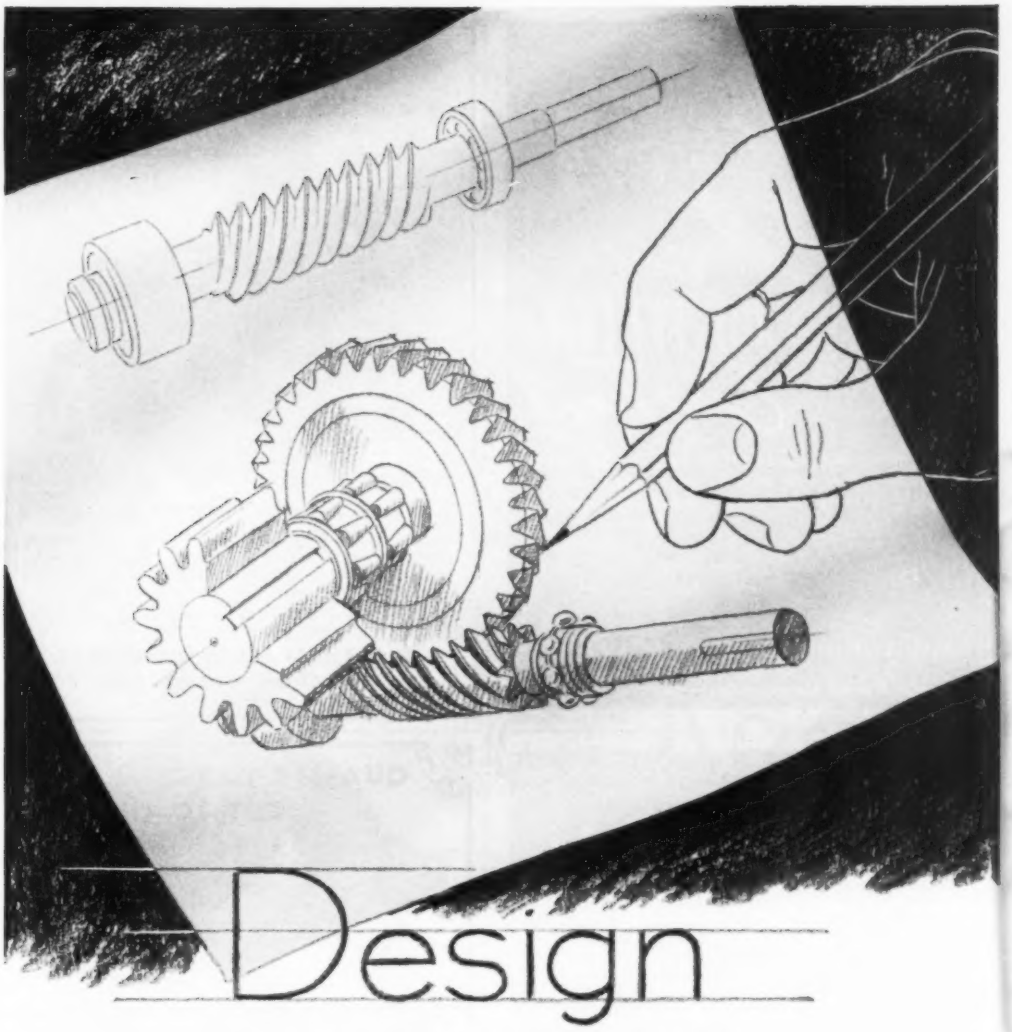
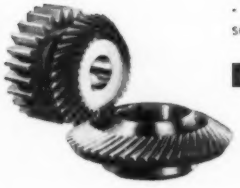


Design

Planning how torque may be applied through gears is a service which, at BRAD FOOTE, we call design. Here . . . in our own plant . . . we have engineers with long experience designing better, more efficient gear assemblies.

• These men well know BRAD FOOTE's creed—"*No one shares our responsibility.*"

• They know the gears they design—for use in your shop or on the equipment you sell to others—will bear a proud brand name—BRAD FOOTE. So, our designers start your order on its journey through our plant . . . and through a system of complete control which assures satisfactory performance of the gears you buy.



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Every Time!

Each Cincinnati Gear is cut to your exact specifications—you know in advance that it will fit its job precisely . . . run smoothly, quietly.

Spur ★ Worm ★ Internal ★ Spiral Bevel
Helical Herringbone Coniflex Bevel Spline Shaft

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"Gears . . . Good Gears Only"
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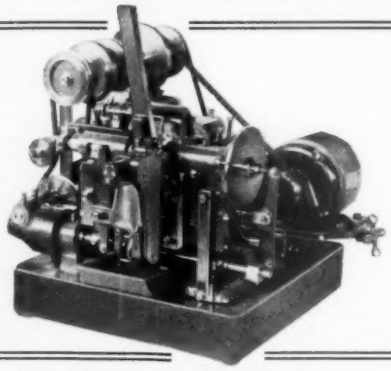

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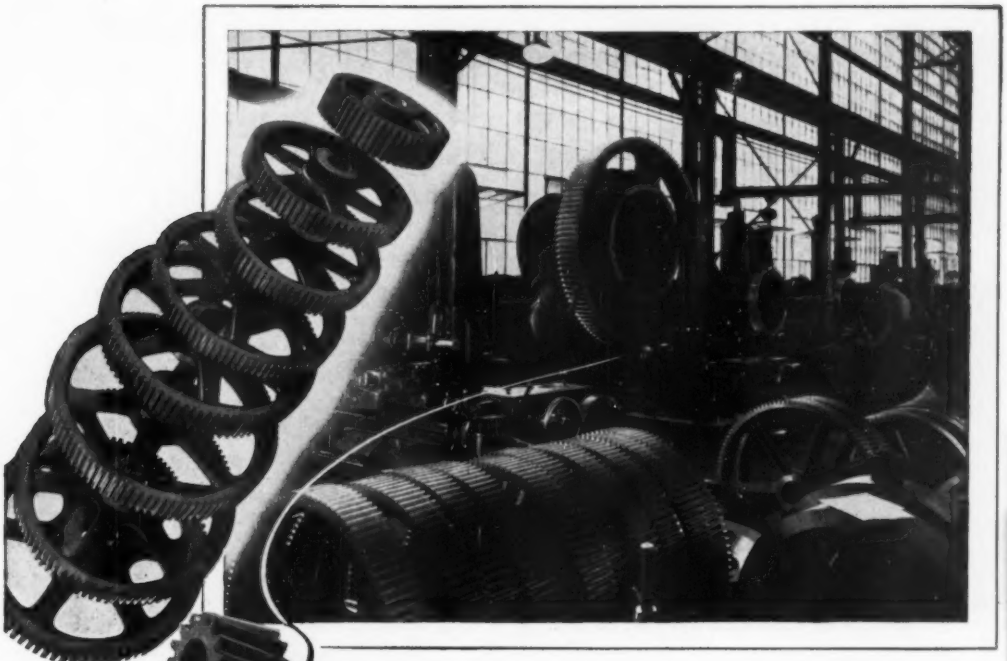

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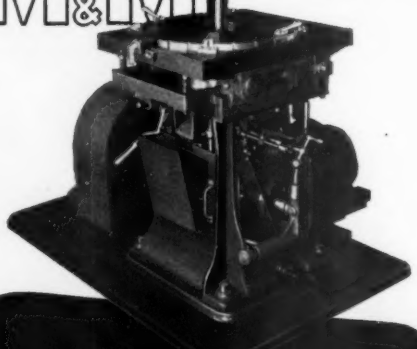

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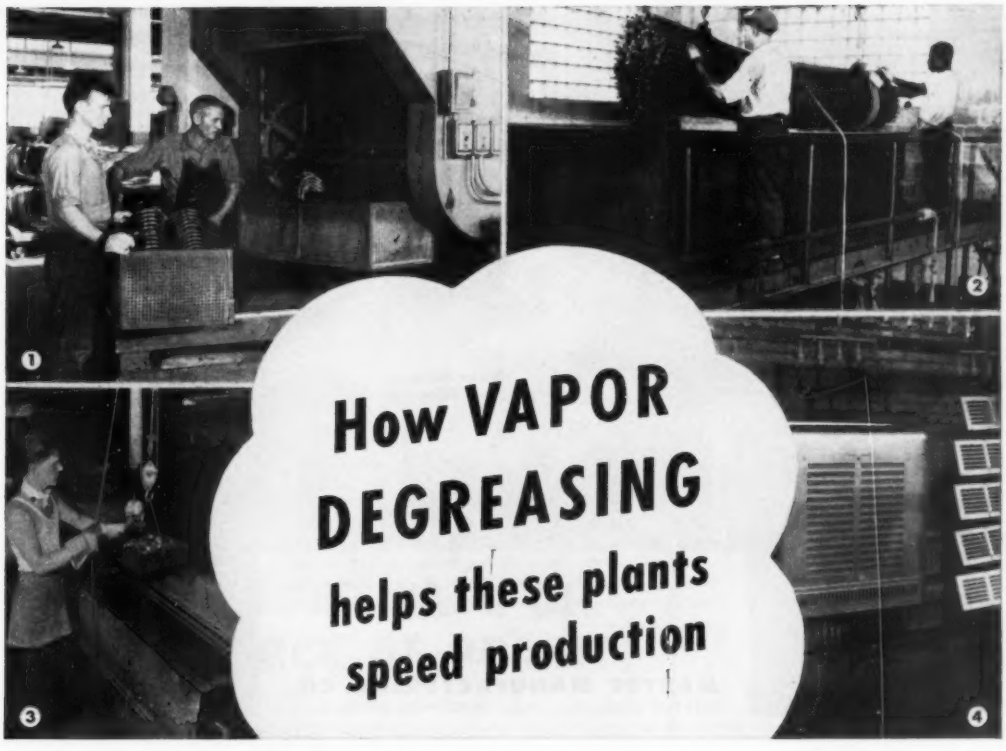

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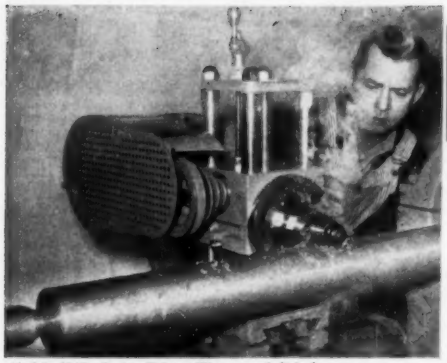

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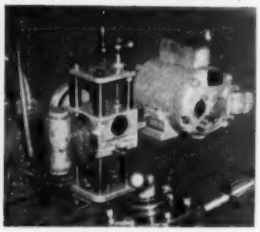

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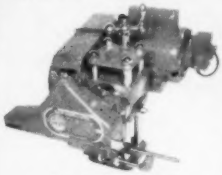

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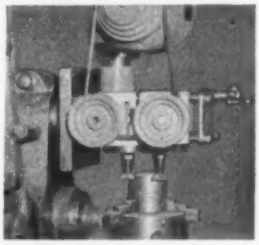

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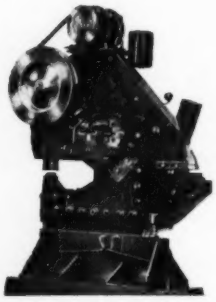

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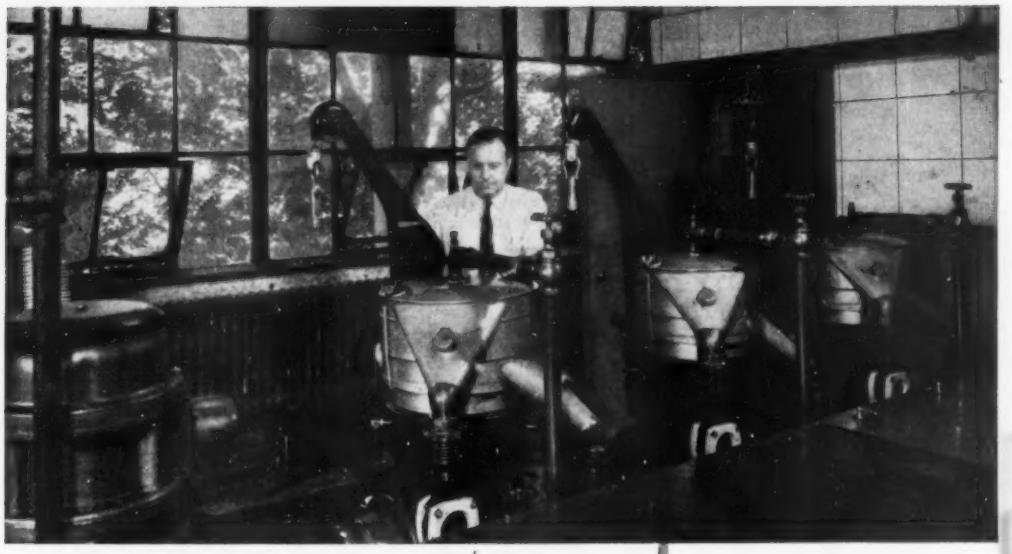

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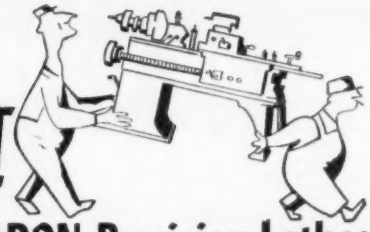

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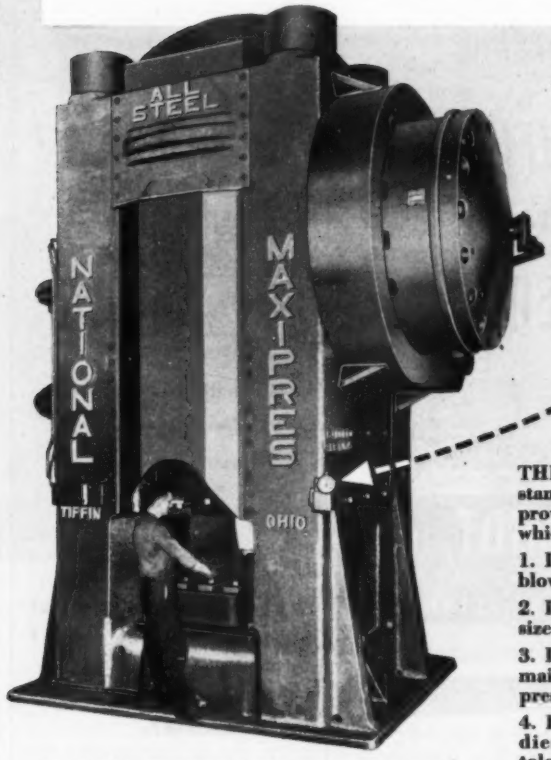

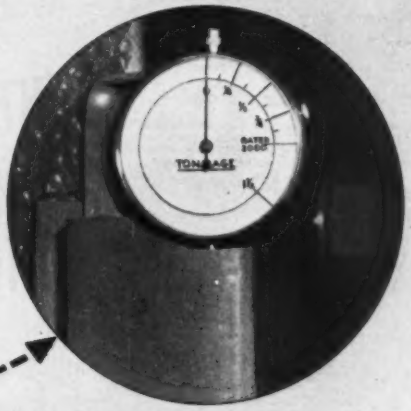

No. 6 MAXIPRES with Tonnage Indicator

* Patent applied for

THE NATIONAL TONNAGE INDICATOR, standard equipment on new MAXIPRESSES, provides *definite* answers to tonnage questions which have gone unanswered for years.

1. It shows at a glance, the actual "blow by blow" tonnage required to make a forging.

2. It permits the reliable choice of the proper size MAXIPRES for a given job.

3. It immediately detects overload, reducing maintenance and lengthening the life of the press.

4. It permits use of kissing surfaces on press dies, making it possible to hold thickness tolerances heretofore unattainable, *without danger of overloading!*

Simple in construction, this device joins the list of NATIONAL-pioneered "firsts" for the forging industry.

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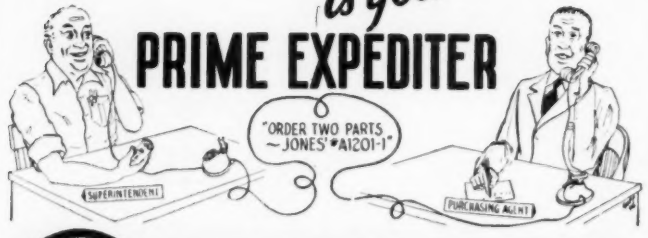

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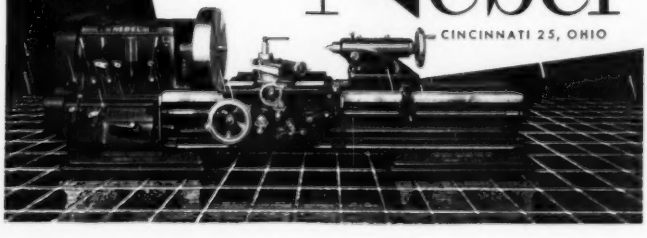

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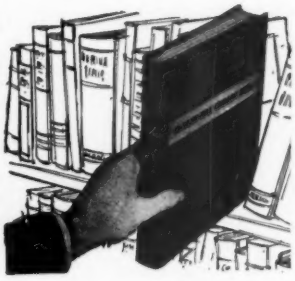

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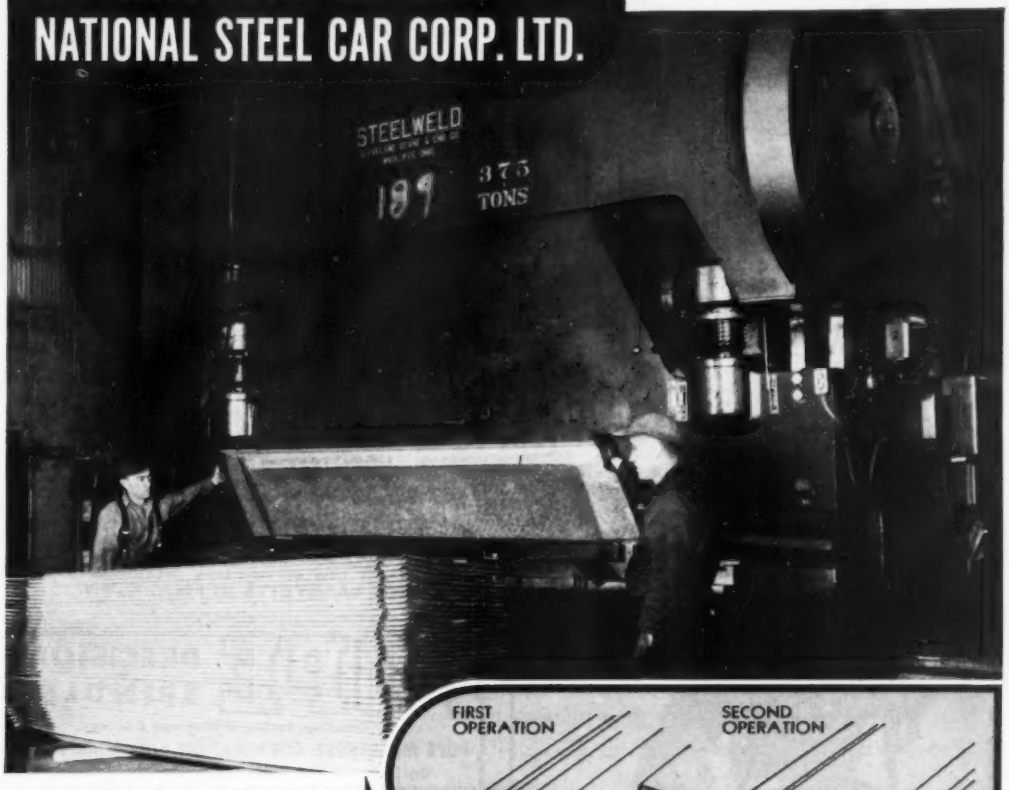

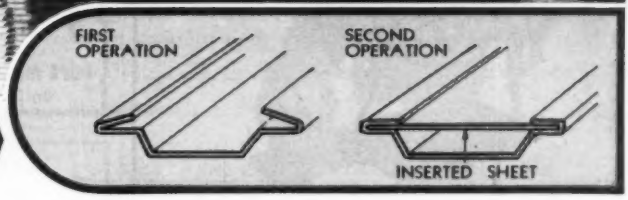

Flue panels for Canadian Pacific Railway refrigerator cars are shaped on this 375 ton press as illustrated in sketches.

Two Steelweld Presses installed in 1937 and 1941, at National Steel Car Corporation, Limited, Hamilton, Canada are operated continuously for various forming and punching operations on metal from 18 gauge to ½ inch.

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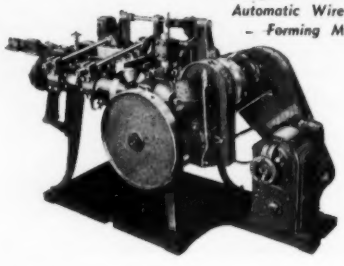

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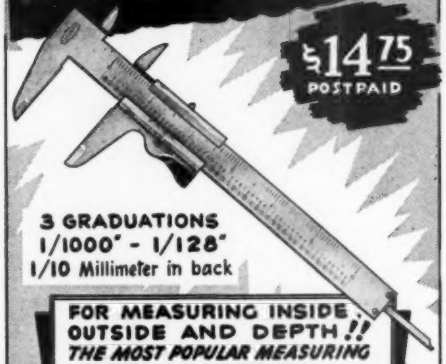

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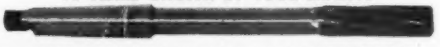

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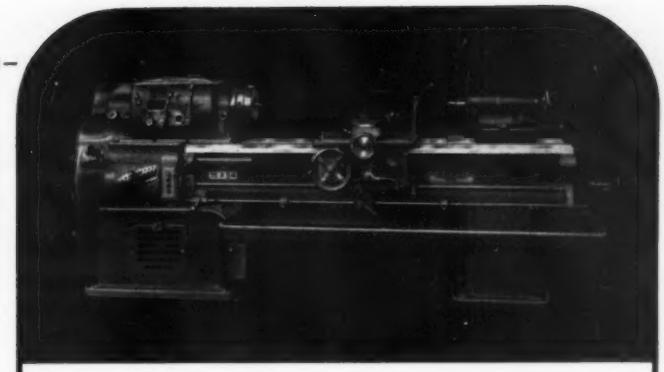

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16", 18-speed engine lathes – for precision turning

FEATURING induction hardened and ground precision bed ways

PLUS—

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Special Clamping Device for Tailstock.

Every feature necessary for precision turning at modern production speeds is incorporated in the 16-inch, 18-speed Hendey engine lathe—in other words, *Built to Hendey's Modern Precision Standards.* The operator will find every convenience—from easy-operating controls to features that practically eliminate maintenance. Induction hardened and precision ground bed ways provide life-long precision for both carriage and tailstock. This modern Hendey Tool Room Lathe is available in standard and tool room models. The latter is shown below with sub-headstock for producing threads with long leads. *Write for catalog.*

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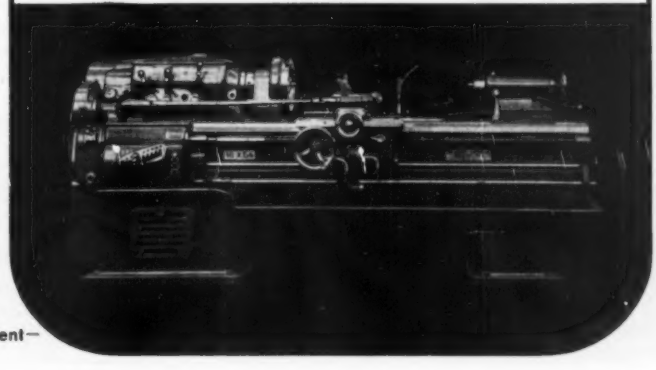

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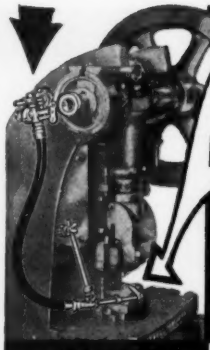

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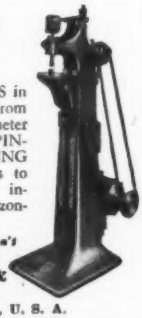

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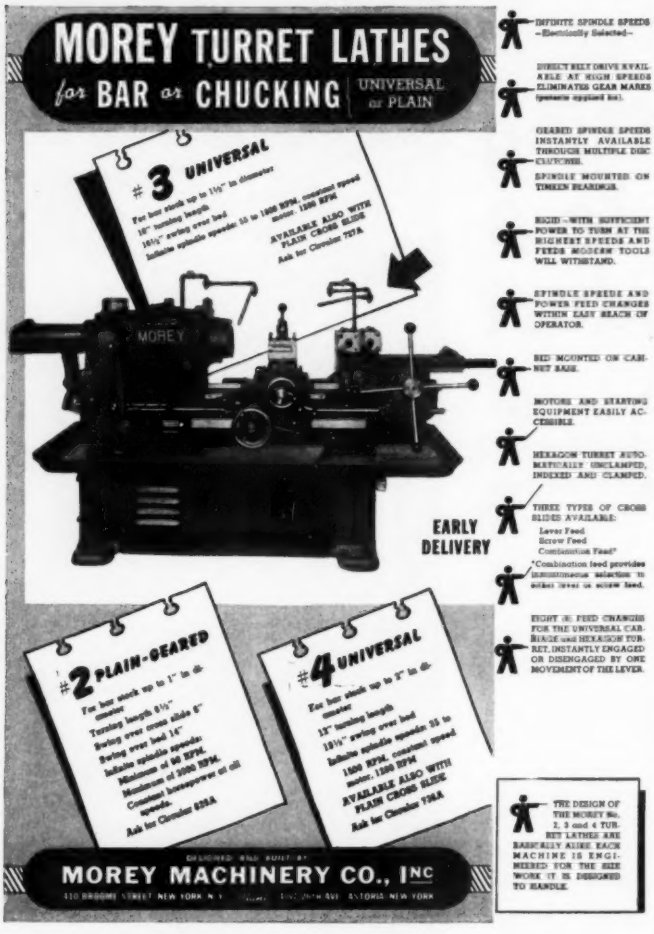
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SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.
BED MOUNTED ON CABINET BASE.
MOTORS AND STARTING EQUIPMENT EASILY ACCESSIBLE.
HEXAGON TURRET AUTOMATICALLY UNCLAMPED, INDEXED AND CLAMPED.
THREE TYPES OF CROSS SLIDES AVAILABLE:
Lever Feed
Screw Feed
Combination Feed*
*Combination feed provides instantaneous selection to either lever or screw feed.
EIGHT (8) FEED CHANGES FOR THE UNIVERSAL CARRIAGE and HEXAGON TURRET, INSTANTLY ENGAGED OR DISENGAGED BY ONE MOVEMENT OF THE LEVER.
EARLY DELIVERY
THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.
DESIGNED AND BUILT BY
MOREY MACHINERY CO., INC
510 BROOME STREET NEW YORK N. Y.

FOR DETAILS — Wire 'Phone or Write!

Telephone CAnal 6-7400

From the *American Machinist* Library of *Tips for Top Shop Men*

THERE'S one flaw in the old saying about the better mousetrap. Somebody else must find out it has been made, or the world will never know. Remember that about plans and policies too: if you want them known, tell somebody; if not, don't even tell your wife.

COLOR and language are not the only criteria of a man's ability. Some refugees are skilled mechanics, for example, and hate the same things Americans hate. Somebody in World War II said the way to tell a man's potential is to look for a light in his eyes. Dull eyes usually go with dull wit or dulled ambition.

Refer To . . .

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When the need for an electrical product arises in your plant.

Hundreds of pages of manufacturers' buying information on electrical items *exclusively* will help you compare, and determine source of supply.

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There is no charge to qualified users.

Gage Block Set 35A. Larger or smaller sets, and individual blocks, are also available.
Below: Set of Tungsten Carbide Wear Blocks.

NO FINER GAGE BLOCKS ARE MADE
Anywhere in the World

A strong statement — ***but fact!*** Taft-Peirce Gage Blocks are made from the finest alloy steel, carefully hardened and seasoned. Surfaces lapped to the highest degree of flatness and finish insure the ultimate in accuracy and durability. Dimensions, clearly marked on the edges, are always visible when in use — a Taft-Peirce exclusive.

The 35A Gage Block Set permits all dimensions from .300″ to 8.000″ in steps of .0001″ to be obtained—a truly economical set! For a wider range, the 82A Set, consisting of 81 blocks and an extra, measuring .10005″, provides all dimensions from .200″ to 12.000″ in steps of .0001″ and from .300″ to 12.000″ in steps of .00005″. Tungsten Carbide Wear Blocks, measuring .050″ and .100″, are also available to increase the life of any gage block set. Write for more information today.

THE TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND
Branch offices in all major cities

T-P means TOP PRECISION

It's time we got *working* mad!

As we listen to the latest insults from Moscow, we're likely to get fighting mad.

Instead, we'd better use our heads and get *working* mad.

It is clear by now that Stalin and his gang respect just one thing—strength. Behind the Iron Curtain they've been building a huge fighting machine while we were reducing ours. Now we must rebuild our defenses—*fast*.

As things stand today, there is just *one* way to prevent World War III. That is to re-arm—to become strong—and to stay that way!

This calls for better productivity all along the line. Not just in making guns, tanks and planes, but in turning out civilian goods, too.

Arms must come first. But we must produce arms *at the same time* we produce civilian goods.

We can do this double job if we all work together to turn out more for every hour we work—if we use our ingenuity to step up productivity.

All of us must now make sacrifices for the common good. But we're working for the biggest reward of all —*peace with freedom!*

THE BETTER WE PRODUCE THE STRONGER WE GROW

A PUBLIC SERVICE PROJECT · THE ADVERTISING COUNCIL

FOR A FREE COPY OF "THE MIRACLE OF AMERICA"

MAIL THE COUPON to Public Policy Committee, The Advertising Council, Inc., Dept. B.P., 25 West 45th Street New York 19, N. Y.

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NEW ADVERTISING received by 10 A.M. May 25th will appear in the issue of June 11th subject to limitation of space available

J. L. OVERHOLT
WABASH EMPLOYMENT AGENCY
202 South State Street
Chicago 4, Illinois WABASH—5020

Specializes in placing all types of draftsmen, designers, engineers, technical men and executives.
Write for full information today.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
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POSITIONS VACANT

MECHANICAL ENGINEERS, layout men, detailers and checkers to design lathes. Excellent opportunities in expanding organization for qualified men. Wages commensurate with experience. Replies held in strictest confidence. Include summary of experience in letter to Monarch Machine Tool Company, Sidney, Ohio.

MASTER MECHANIC of machine shop operations, wanted by high alloy casting company. Permanent position and excellent future with growing progressive company. Give full details of experience and qualifications. All replies will be held strictly confidential. P-9834, American Machinist.

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SALARIED POSITIONS $3,500 to $35,000. We offer the original personal employment service (established 41 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. Bixby, Inc., 266 Dun Bldg., Buffalo 2, N. Y.

POSITION WANTED

MANUFACTURING EXECUTIVE desires change 23 years experience light or heavy machining and assemblies. Qualified, successful background. Capable of handling all phases of production, manufacturing, cost control, production control, methods, plant engineering, purchasing, incentives, quality control, labor relations, and contract negotiations. Salary open. PW-9796, American Machinist.

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Simple acting combination dies,
one operation deep drawing and trimming with or without a flange for various forms, for sheet metal. PFS-9779, American Machinist.

PATENT ATTORNEY

Consult: Z. H. Polachek
Reg. Patent Attorney, 1234 Broadway, New York 1, N. Y.

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Remove the most stubborn stoppage by elec. mach. Cable crawls around bends, up stacks, through traps, etc. NO DIGGING NECESSARY. Saves you time and money. Price $165.00. Write for descriptive literature.

ELECTRIC SEWER CLEANING CO.
294 Lincoln St., Allston 34, Mass.

AGENCY FACILITIES
for
High Class Machine Tools, Engineering Equipment, Tools, etc.

W. E. SYKES LTD.
(Agency Division)
STAINES • MIDDLESEX
ENGLAND

The above are seeking representation for GREAT BRITAIN, NORTHERN IRELAND, AUSTRALIA, SOUTH AFRICA and FRANCE for certain types of high class Machine Tools, Engineering Equipment, Tools etc.—the products of reputable American manufacturers.

Typical examples of the type of Machine Agencies required which would not conflict with existing lines:—
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- **Vertical Boring and Turning Mills**
- **Horizontal and/or Vertical Broaching Machines and Broaches**
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- **Keyseating Machines**
- **Single and Multi Spindle Automatics**
- **Centreless Grinders**
- **Plano — Millers**
- **Planing Machines of over 5' x 4'**
- **Cylindrical Grinders of over 12"**
- **Surface Grinders of over 8" x 24"**
- **Power Presses**
- **Gear Tooth Rounding and Chamfering Machines**
- **General Wood Working Machines**
- **Shaping Machines**

Facilities offered by the Agency Division of W. E. Sykes Ltd., embrace a complete sales organization comprising Central London Showrooms and Offices, highly trained and experienced technicians and sales force. Their activities already cover agencies for the following:—
- **Planers**
- **Lathes (all types)**
- **Fine Boring Machines**
- **Vertical Slotting Machines**
- **Jig Boring Machines up to 5½" bore dia.**
- **Spiral Gear Hobbing Machines**
- **Gear Testing and Checking Machines, Instruments and Equipment**
- **Surface Grinders**
- **Universal Grinders**
- **Camshaft and Oval Grinders**
- **Vertical and Horizontal Plain and Universal Milling Machines**
- **Cutter and Hob Sharpening Machines**
- **Gear Producing Machines, Hobs and Gear Shaper Cutters**

Available for servicing after sales are the manufacturing facilities of W. E. Sykes Ltd., specialists in the manufacture and production of the world famous range of Gear Generating Machines, Hobbing and Shaving Machines, and also all types of gear producing tools, equipment, etc.

Principals will be visiting the U. S. in June/July to discuss with manufacturers any proposals for representation of the above or any other interesting products.

DISTRIBUTOR WANTED

For new type filing-machine, Swiss made, distributor for entire USA is sought. Floor model does work better and 3 times faster than grinding wheel. Model can be inspected. Please apply to

F. PROEWIG
DEMOTT PLACE, WANTAGH, N. Y.

CONTRACT Metalwork WANTED

Arrow Safety Device Co., a well-established company located in Mt. Holly, N. J., now manufacturing automotive equipment, offers the following facilities on a subcontract basis:

METAL STAMPING
- Single action and double action presses capable of piercing, blanking, and drawing to 10" deep
- Shearer measuring 3/16"x10'

SPOT WELDING & RIVETING

FINISHING
- Electrostatic painting
- Bonderizing
- Plating of copper, nickel, chrome, zinc and cadmium
- Polishing

ASSEMBLY
- Hand assembly of small parts

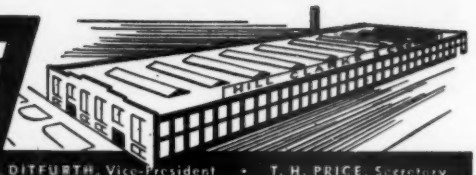
In addition to a well-equipped toolroom, manned by skilled personnel, Arrow has a large, experienced engineering and design department capable of furnishing valuable assistance from development to the finished product. Our purchasing department has had extensive experience in obtaining a wide range of diversified materials.

Write or wire
CONTRACT DEPT.
ARROW
SAFETY DEVICE COMPANY
MOUNT HOLLY, NEW JERSEY

CONTRACT WORK WANTED
Grinding Service
We have free time on our Norton C 10" x 36" cylindrical grinder.
Inquiry to:
HYDRO-POINT ENGINEERING COMPANY
Box 488, Hamilton, Montana PH. 544-W

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us—we will take care of them
GENERAL PATTERN WORKS
2233 Park Street Cincinnati, Ohio

HILL-CLARKE
MACHINERY COMPANY



H. W. MONS, President • W. L. DITFURTH, Vice-President • T. H. PRICE, Secretary

DRILLS
1 Spdl—28" Sw—No. 2 LMS L.G. Hyd.
2 Spdl—24" Sw—No. 2 Avey matic
3 Spdl—15" Sw—No. 2—MA 6—Avey
6 Spdl—14" Sw—No. 2 LMS L.G. Hyd.

GEAR MACHINES
No. 61-A Fellows Gear Shaper (1942)
No. 12 HS Gould & Eberhardt Hobber
No. 72 Fellows Gear Shaper
11" Gleason Bevel Gear Generator
No. 13 Brown & Sharpe Spur & Bevel
No. 1 Whiton Auto. Gear Cutter
No. 6 Gleason Bevel Gear Tester (1942)

BORING MACHINES
Rockford—3½" Bar
34" King Vert. Bor. Mill

GRINDERS
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x36" Norton Type C (1943)
10"x72" Landis Type C Hydraulic
Hill-Clarke Norton Type Motor Driven Grinders
10"x36" centers
10"x50" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x72" centers
14"x120" centers
16"-40" gap x 120" centers
18"x96" centers
18"-30" Gap x 96" centers
20"x96" centers
23"x36" centers
24"-32" Gap x 144" centers
26"x72" Norton Crank Shaft Grinder
15"x15"x8' Norton Surf. Gdr.
No. 25-A Heald Surface Grinder
No. 104 Rivett Internal Gdr. (1943)
72-A-3 Heald Internal Gdr.
No. 72-A-5 Heald Internal (1942)
No. 18-16 Bryant Internal Grd.
No. 18-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 81 Heald Centerless Internal

LATHES
Model R-14 Seneca Falls Lo-Swing
No. 4 Warner & Swasey Tur.-Bar Fd.
No. 6 Warner & Swasey Tur.-Bar Fd.
2¼"x24" Jones & Lamson

MILLING MACHINES
No. 3 Cincinnati H.P. Universal
No. 06 Cincinnati Plain
No. 08 Cincinnati Vert.
No. 3 Sundstrand Rigidmil
No. 45-48 Cin. Hyd. Tracer (1941)
6"x36" Lees-Bradner—Model LT (1943)
6"x80" Pratt & Whitney Thrd. Mill
6"x132" Pratt & Whitney Thrd. Mill
6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney Thread (1942)
10"x60" Pratt & Whitney Thrd. Mill
48"x24"x12' Ingersoll Slab Miller, 4 Hds.

MISCELLANEOUS
15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
16" Newton Slotter
No. 0 Bakewell Tapper
Baush Radial Tapper
No. 307 Barnes Hone
Model H-7 Micromatic Vert,. Hone, 1 Spdl.
Model 200 Micromatic Horiz. Hone, 1 Spdl.
Model H-2 Micromatic Horiz. Hone, 2 Spdl.
Model 200—H3 Micro.—Horz.—2 Spdl.
14" Niles-Bement-Pond Roll
Am. Chip Wringers (New) 3.3 to 12.8 bushel capacity

PLANERS
36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 Hds.
42"x42"x10' Cincinnati 2 hds.
48"x36"x14' Gray

C-3

Write, Wire or Phone **HILL-CLARKE** *MACHINERY COMPANY*
651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

LATE MODEL MACHINE TOOLS . .

AUTOMATICS
1½" Four Spdl. Cone. 1948.
2¾"x25" Fay Automatic. 1942.
No. 3-8 Cone ⅝" Cap. 1942.

DRILLS
No. 48M Fosdick. 1942.
No. 2 LMS Leland Gifford Hyd. 1942.

GEAR EQUIPMENT
No. 645A3 & 61A Fellows Gear Shaper. 1944.
No. 6 Gleason Revacycle. 1948.
No. 6 Gleason Gear Tester. 1942.
8" Red Ring Internal Shaver. 1942.
15" Red Ring Lapper. 1942.
Red Ring Universal Tester. 1942.

GRINDERS, CYLINDRICAL
14"x160" Norton Plain Type C. 1942.
14"x48" Norton Pl. Type C. Hyd. 1941.
14"x36" Landis Univ. Type C. Hyd. 1942.
12"x30" Norton Universal. 1941.
10"x18" Norton Type C Plain. 1942.

GRINDERS—INTERNAL
No. 24-36 Bryant. 1943.
No. 172 Heald Hyd. Gap. 1940.
No. 81 Heald Plain Hyd. 1940.
72A3 Heald Plain Hyd. 1942.
No. 50 Heald Hyd. 1943.
No. 5 Bryant. Late.

GRINDERS—THREAD
No. 35L Excello Precision. 1943.
No. TG-615 Jones & Lamson. 1942.

GUN BARREL MACHINES
No. 410 Barnes Deep Hole Drill. 1943.
No. ½Bx50 P & W Reamer. 1942.
No. ½Bx30 P & W Reamer. 1942.
No. ½Bx50 P & W Rifler. 1942.

LATHES—ENGINE
36"x306" American G.H.
20"x240" LeBlond. 1941.
20"x18" Reed-Prentice. 1942.

LATHES—PRODUCTION
No. 3A Lodge & Shipley Duomatic. 1941.
No. 3 FU Foster "Fastermatic". 1942.
14"x42" Monarch "Magnamatic". 1941.
Lips Carbo-Matic. 1942.
LeBlond Multi-Cut. Late.
No. 4-14 Lo-Swing. 1941.

LATHES, TURRET
No. 4A Warner & Swasey. 1942.
No. 1A Warner & Swasey. 1938.
No. 1H-6 Libby Universal. 1942.

MILLS, PRODUCTION
No. 34-36 Cincinnati Hydro. 1942.
No. 5-48 Cincinnati Hydromatic. 1942.
No. 2-20 Kent Owens. 1942.
No. 1-14 Kent Owens Hyd. 1942.

MILLS, THREAD
6"x6" LT Lees Bradner. 1942.

MISCELLANEOUS
48"x½" Niles Plate Straightener.
No. 616 Cleveland Rigidturner. 1942.

SHAPERS
20" Cincinnati Plain. Late.
6" Pratt & Whitney Vertical. 1942.

WELDERS
100 KVA Taylor-Winfield Seam. 1943.

Write for latest stock list

INDIANAPOLIS *Machinery & Supply Co.*
1961 S. Meridian St. . . Indianapolis, Indiana

MUST MOVE PROMPTLY FROM LOCAL CUSTOMER'S PLANT

BEMENT MILES 18" SLOTTER with 3" dia. spindle. M.D.

GOULD & EBERHARD 40" Gear Cutter, M.D.

BROWN & SHARPE #S—48" Gear Cutter, M.D.

KEMPSMITH #4 Maxi-Miller, M.D.

BINSEE MACHINERY COMPANY HORIZONTAL BORING MILL. Table 30"x64". Quantity of boring bars.

LODGE & SHIPLEY 30"x72" c to c Geared Head, Quick Change Lathe, M.D.

CINCINNATI 60"x60"x14' Planer. 4 heads. 1 extra side head on massive floor stand for open side work. M.D.

LEBLOND 28"x14' QUICK CHANGE LATHE. Cone or M.D.

AMERICAN 20"x16' QUICK CHANGE GEAR LATHE. M.D. Old, but good.

BARNES HEAVY DUTY 26", 4-SPINDLE DRILL. 1 spindle for tapping. M. D. #4 M.T.

GRINDERS—CYLINDRICAL. B & S #11. 7"x 32". Plain Grinder. Table swivels. Motorized with 4 motors.

LANDIS 10"x36" Plain, M.D. Also Planer type Grinder 16"x36".

GRAY 32"x32"x10' PLANER. 2 swivelling heads. M.D.

"BEMENT" 26" STROKE TRAVERSING HEAD SHAPER. 48" travel to ram. 2 tables.

(PLANER SHAPER)

THE OSBORNE & SEXTON MACHINERY CO.

P. O. Box 88 Columbus 16, Ohio

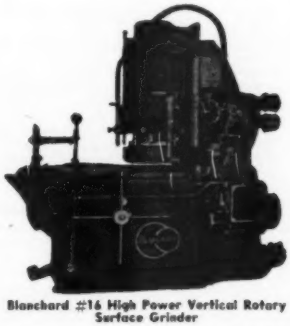
BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

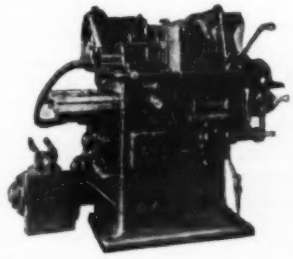
AUTOMATIC, Cleveland #B-1½" Sgl. Spdl.
AUTOMATIC, #0 B & S Auto. Cut-Off 11/16" Cap.
AUTOMATIC, B & S Wire Feed. 1".
AUTOMATIC, B & S #2G, 1".
AUTOMATIC, #53 Acme-Gridley 4-Spdl. 1" Cap. Lot of collets, cams, pads, gears. Thrd. spindle and Die Head. 5 h.p. 3/60/220/440 volts.
AUTOMATIC, National-Acme Sgle. Spdl. 4¼".
BORING MILL, Colburn 60" Vert. Two Hds.
BORING MILL, Lucas #31 Horiz. 3" Bar.
BORING MILL, Giddings & L #32 Horiz. 3½" Bar.
BORING MILL, Ryerson #11 Horiz. 3" Cap. #6 M.T.
BORING MILL, Barrett #2 Horiz. Cyl. Borer, 5".
BORING MILL, King 42" Three Head Vertical. A.C. Motor Dr. Power Rapid Traverse to each head. Sommer & Adams #29A Boring, Hobbing & Threading Machine. Timken Bearings. Swings 36" over bed. 18" cross feed, 42" longit. Carriage has rapid approach & return. Used to mill internal threads.
BORING MILL, #0 Giddings & Lewis, 3¼" Bar. #5 M.T. 220/440 volts.
BOREMATIC, Heald #49 Sgle. End. W/Univ. Fixture, 220/440 volts.
BROACH, Oilgear 10 Tons Horiz. 56" Str.
RADIAL DRILL, Fosdick 5' Arm. 14" Col. #5 M.T.
RADIAL DRILL, Carlton 4'-15". Motor Dr.
DRILL, Radial, 5'-11" Canedy-Otto NEW.
DRILL, Radial, 3'-11" Canedy-Otto NEW.
DRILL, Radial, 3'-11" American.
DRILL, Radial, Cinci-Bick, 5' Arm, 13" Col. #5 M.T. 21-speed gearbox. 7½ h.p. 3/60/220.
DRILL, Deep Hole, Avey-Draulic #2 Sgle. Spdle.
DRILL, Deep Hole, Pratt Whitney #2 Four Speed Gun Barrel & Tube Drilling Machine. Drills 72" long, 3" diameter. M. Drive.
DRILL, Baker #314 Hvy. Pattern High Speed Vertical Boring & Drilling Machine, 7½ h.p. 220/440 motor, #5 taper, 12 feeds, 6 speeds, 12¼" throat, 3" capacity in steel.
3—SPDL. DRILL, Edlund #2B, #2 M.T. 16", 9½"
DRILL, Cincinnati 21" Brdg. Drilling & Tapping.
DRILL, Natco #12 Multiple Spindle Motor Driven. #1 taper, 3 h.p. 220/440 motor. Arranged for 18 spindles. Rectangular head, with Natco 24" Rotary Table.
DISC GRINDER, Besley #20S—18" Dble. End Motor Driven. 220/440 volts. Wet or Dry.
GRINDER, Cylindrical, Brown & Sharpe #2 Universal. 220/440 motors.
GRINDER, Hammond #14W Carbide, Dbl. End.
GRINDER, Oakley #3 Univ. Tool & Cutter.
GRINDER, Sellers #1A Hvy. Duty Tool.
GRINDER, G & L #4 Univ. Tool & Cutter.
GRINDER, Heald #25 Surface, 12" Chuck.
GRINDER, Cam, Landis 5"x40" "Type D" Hydraulic Semi-Automatic. New in 1942. Slight use, like new.
GRINDER, Cylindrical, Norton 10"x24" Hydraulic.
GRINDER, Cylindrical, B & Sharpe #4 Univ.
GRINDER, Cylindrical, B & Sharpe #10. 6x18.
GRINDER, Cylindrical, Cinci. 6x18 Hydraulic.
THREAD GRINDER, J & Lamson #TG-615 Automatic. Late Type.



Blanchard #16 High Power Vertical Rotary Surface Grinder

PARTIAL LISTING OF LARGEST STOCK IN THIS AREA

GRINDER, Landis Crank 10x32 Hydraulic.
GRINDER, Brown & Sharpe #2 Auto. Horiz. Surface.
GRINDER, Cincinnati #EA, 10" x 36" Hydraulic Cylindrical, Filmatic Bearings, 220 volts motors.
GRINDER, Heald #72A-3 Size-Matic Internal.
GRINDER, Norton 6x18 Hydraulic Vert. Rotary.
GRINDER, Norton 6 x 18 Hydraulic Horiz. Surface.
GRINDER, Pratt Whitney 14x36 Vert. Rotary.
GRINDER, Springfield #2 Automatic Planer Surface. 24"x18"x4". A.C. Motor Dr.



Greenfield #12 Internal Hydromatic Grinder

GRINDER, Broach, Thompson 6"x48" Automatic Indexing Hydromatic. A.C. Motor Dr.
GRINDER, Cutter, Ingersoll 30".
GRINDER, Tool Cutter, B & S #13 Univ.
GEAR HOBBER, B & S #34 Spur. 18" dia.
GEAR HOBBER, Adams #5 Thread Miller & Gear Hobber. Size 10"x48". A.C. Motor Dr.

Hilles & Jones #6 Pyramid Type Motor Driven Plate Bending Rolls. Size—14'x½". Top roll —22" dia. Lower rolls—15" dia. Immediate delivery.

GEAR SHAPER, Fellows #6 High Speed.
GEAR SHAPER, Fellows #72 High Speed.
GEAR SHAPER, Fellows #62 High Speed.
GEAR SHAPER, Fellows #7 High Speed.
HAMMER, Bradley 200# Rubber Cushioned Helve, 225 to 240 blows per minute.
HEADER, Manville #1 S.S.S.D. Cold, 3/16".
LATHE, Pond 36"x108" Grd. Hd. With Equip.
LATHE, 33"x16' Bridgeford Q.C.G. Grd. Hd.
LATHE, Niles 30"x30' Grd. Hd. With Equip.
LATHE, 26"x18' Bridgeford Q.C.G. Grd. Hd.
LATHE, 24"x8' Lodge Shipley, Hvy. Duty.
LATHE, 24"x14' LeBlond Q.C.G. Grd. Hd.
LATHE, 20"x10' American Q.C.G. 72" c.c.
LATHE, 20"x10' Hendey Q.C.G. Taper Att.
LATHE, Reed-Prentice 20"x60" Grd. Hd.
LATHE, 18"x8' Lodge Shipley Q.C.G. Gr. Hd.
LATHE, 18"x10' American Q.C.G. Grd. Hd.
LATHE, 16"x6' American Q.C.G. Grd. Hd.
LATHE, 16"x6' LeBlond Q.C.G. Taper Attach.
LATHE, 16"x6' Lodge Shipley Q.C.G. Grd. Hd.
LATHE, 14"x8' Hendey Q.C.G. Taper Attach.
LATHE, 14"x6' LeBlond Q.C.G. 220 volts.
LATHE, 12"x5' Hendey Q.C.G. Taper Attach.
LATHE, 8"x108" Fitchburg Automatic Production.
LATHES, Turret #4 W & S Univ. 1½".

Brown & Sharpe #12 Production Mill

LATHE, Turret #3A Warner Swasey Univ. Grd. Hd. Bar Feed, Tooling & Collets. a.c. motor.
LATHES, Turret, #2 Simmons Grd. Hd. 1".
LATHE, Turret, W & S #6 Grd. Hd. Ram Type. 5 h.p. 440 v. Bar feed.
LATHES, TURRET, Gardons & Oliver #1 Electric Bar Feed ¾" cap. Collets, Rd. Sq. Hx. 220 volts.
MILL & SHAPER, Cochrane & Bly #16 Univ. Duplex Vertical.
MILL, Planer, Ingersoll 36x42x12.
MILLING MACHINE, Vert. #3 Cinci. High Power.
MILLING Machines, Vert. #4 Cinci. High Power.
MILLING Machine, Horiz. #2, #3, #4, #5 High Power. 220/440 Motors. Cincinnati.
MILLING Machine, Horiz. #3 Kempsmith Univer.
MILLING Machine, Horiz. #4 LeBlond Univ. Hvy.
MILLING Machine, Horiz. #1½ B & Sharpe Univ.
MILLING Machine, Horiz. #2 Kempsmith Univ.
MILLING Machine, Horiz. #2 B & Sharpe Univ.
MILLING Machine, Horiz. #3 B & Sharpe Univ.
MILLING Machine, Duplex, Van Norman #2.
MILLING Machine, Prod. #0—6 Cinci. Vertical.
MILLING Machine, Prod. #0—6 Cinci. Auto. Horiz.
MILLING Machine, Prod. #12 B&S 24" Late Type.
MILLING Machine, Horiz. K&T #2B Dble. Overarm. 220/440.
MILLING Machine, Horiz. Nichols Hand Millers.
MILLING Machine, U. S. #MM1-8 Cam Controlled Automatic Horizontal, #40 taper. Late Type. 220/440.
THREAD MILLER, Hanson Whitney 4"x9" Univ. Semi-Automatic. 220/440 volts.
THREAD MILLER, Leos Bradner #40A Automatic Chucking. 220/440 v.
THREAD MILLER, Pan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, #40 Spdl. Timken Bearing. THY-MO-THOL Control Unit.
PLANER, Gray 26x26x10. A.C. Motor Dr.
TAPPER, W & S #1 Sgle. Spdle.
POWER PRESS, Bliss #164 Open Back S.S.S.A.
POWER PRESS, Bliss #3A S.S. Dble. Crank S.A. Grd. 45 tons, 4" stroke, 36" between uprights.
POWER PRESS — Bliss - Consolidated #183 - B Straight Side Dble. Crank Single Action, 45 tons.
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PRESS, V & O #2½ O.B.I. 25 tons.
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PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRESS, Federal #2 O.B.I. 2" Stro.
PRESS, Federal #3 O.B.I. Grd. 4" Stro.
PUNCH, Hilles & Jones #2 Sgle. End.
PUNCH, Hilles & Jones #5 Sgle. End.
CUT-OFF SAW, Yates-American #M-90. 220/440.
SAW, Band, Tannewitz #GH-36" High Speed.
SHAPER, Vert., Pratt Whitney #B—6" Motor Dr.
SHAPER—Columbia 32" D.G. Crank.
SHAPER, Morton 36" Draw-Cut, 4-Speed.
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62" Niles Bement Pond, 2 heads, PRT, M.D.

44" Bullard "Maxi-Mill", 2 heads, PRT, M.D.

Abrasive Cutoff, #213 Campbell, 7½ H.P., late.
Bending Roll, 8' x ½" Newbold, pinch, all steel, 1940.
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Boring Mill, 44" Bullard Maxi-Mill, Vert. PRT, M.D.
Drill, 4 spindle, #2 KH Allen, ½" chucks, late.
Drill, 3 spindle, #2MS Leland Gifford, Mtr. Spdles.
Drill, Radial, 6' N-B-P "Rightline" M. on arm.
Drill, Radial, 6' Dreses, gear box, M.D.
Drill, Radial, 8' Western, gear box, M.D.
Gear Hobber, #36H Gould & Eberhardt univ.
Gear Lapper, Type 7LS Fellows, 1942.
Grinder, Surface, 6" x 18" Norton, hydraul., 1942
Grinder, Surface, 8" x 54" Thompson, M.D.
Grinder, Surface, #34 Abrasive Vert., '41.
Grinder, #5 Bryant, internal, late.
Lates, Duomatic, #3A Lodge & Shipley, 171" c.c., double carriage 1942.
Lathe, 68" x 24' Niles, grd. hd., M.D.
Lathe, 54" x 20' Johnson, taper, M.D.
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Lathe, 16" x 8' American, taper, M. in base.
Lathe, Automatic, 12" x 24" Lipe-Carbo.
Miller, Production, #1-12 Cincinnati, 1942
Miller, Universal, #4 Cincinnati, Hi-Power, M.D.
Miller, Plain, #1½ B Milwaukee, M.D.
Miller, Plain, #1B Milwaukee, M.D.
Miller, Production, #000 Brown & Sharpe
Miller, Vertical, #14 Cochrane Bly, slot. attach.
Planer, 36" x 36" x 12' Cincinnati, 2 hds., M.D.
Planer, 42" x 42" x 16' Gray, 3 hds., M.D.
Turret Lathe, #2G Morey, bar, collets, 1942.
Turret Lathe, #2 Bardon & Oliver, 1943.
Welder, 50 KVA Acme air-press, spot, timer, late.

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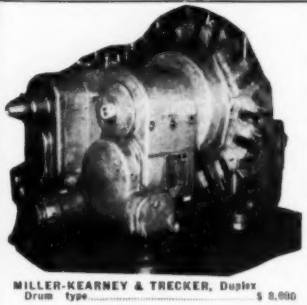

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King 42" Vert. 2 rail heads
Niles-Bement-Pond 4" Bar
Niles-Bement-Pond 4½" Bar
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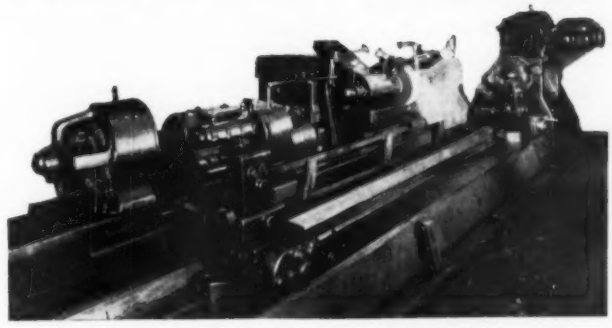
Barber-Colman #12 Hobber (2)
Brown & Sharpe #13 Cutter
Fellows High Speed Shapers 712, 72, 725, 71
Flather 72" Cutter
Gleason 3" Straight Bevel Generator
Gleason #4 Angular Bevel Tester
Gleason #2 Surface Hardener
Gould & Eberhardt 36" Cutter
National Broach Red Ring Lapper, Shaver
Schuchardt & Schutte #1 Hobber
Fellows #20M Redliner

GRINDERS, MISCELLANEOUS

Bryant #5, #16-16
Cinn. #2 centerless Filmatic
Cinn. 12x48" Univ. Filmatic
Covel #91A Univ. Tool & Cutter, Hammond #4
Grenby Int. 1G-12, G2
Heald #73 Internal centerless
Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic, #1 Tool
Landis 12"x36" Univ., Latest
Landis 6"x30" Type C Cyl.
Majestic Internal
Norton 6"x18", 6"x30" Type C cyl., 10x18"
Norton 14"x48" Type C Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer, Sellers 4G, 6G, Black Diamond
Port Cable Belt WGB, G8 Grenby Int.
Pratt & Whitney Radius #R6, K.O. Lee Tool
Wicaco Int.

GRINDERS, SURFACE

Abrasive 3B 8x24", #33, #34 Vert.
Blanchard #16, 30" Mag. Chuck
G & L #45 12"x24" Hyd. Feed, #5, 10"x36"
Heald 22—12" chuck, Arter 12"
Norton 10"x36" Hyd.
Pratt & Whitney 12x36" Vert.
Reid 11x36 Motor in Base
Thompson Hyd. 6x12x18"



Norton Roll Grinder 50" x 28' (actual photo)

LATHES

American 20"x8' Bed G.H. Lathe
L & S #2A Duomatic, Like New, #3 Duomatics
Hardinge Precision 9", 1" Collet Cap., Rivett
Hendey 14" Yoke Head Lathes
LeBlond Regal 10"x3' bed
Lipe-Carbo
Monarch 10"x20" EE Latest (5)
Monarch 12"x30" CKK Late (3)
Putnam 36"x22'
Putnam 42"x17'
Sebastian 12"x4' G.H.
Wickes 32"x35' Geared Head
Sundstrand 8x15"x15" Stub

MILLS, PLAIN, UNIVERSAL & PROD.

Archdale Plain, English Make
Brown & Sharpe #000, 21
Burke #4 Plain & Univ. Vert. Hd.
Cinn. 2MH Univ. Vert. Attach
Cinn. 08 Pl—Rise & Fall
Cincinnati, 1 M Univ. #2 Dial Type
K. & T. 2HL Plain
Kent Owens 1V, 1M
Sundstrand 00, 0 Rigidmil, #1
118 Van Norman, Prod.
6"x20" P&W Thread Mill

MILLS, VERTICAL

Archdale Vert. 15" Rot. Table
Brown & Sharpe #3 single pulley drive
Cincinnati #4, 08 Vert. #2, 3, SPD
Morey #12M Profiler, 2 sp.

PRESSES

Bliss 304A 4" Str.
Bliss 645, 650 Hi-Production Presses
Bliss 18, OBI, 58, 62, 162 OB.
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #781½, 330 Ton, SS
Bliss 3½A Double Action Toggle
Ferracute EG54, 400 Ton Knuckle
Niagara Horning, 15 Ton
Niagara A1¾, O.B.I.
Toledo 400 Ton Knuckle Joint #663
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing

TURRET LATHES

Acme 6W Fox 2 9/16" Cap.
Brown & Sharpe, #1, 2 Hand, #10, 11
Denver, 6, 2" Shell Turret (3)
Gisholt2L, Late, Foster #3B
Gisholt #4 Bar Feed
Jones & Lamson 2½" Saddle Univ. Late
Libby #4R 2" Cap. Univ. Late
Morey #4 Univ. 2G Late
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1A, 2A
Warner & Swasey G.H. Late

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500 ton Shaft Straightener 24' Long Bed. Watson Stillman
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80 Ton Wilson Press, 51"x24" Platen, 11½" St. 13" opening
50 Ton William & White, 20" St. 54"x 20" Bed—24" opening
35 Ton Oil Gear Straightener
50 Ton Stokes Molding Press

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Automatic B & S #00G
Automatic 4 Sp. 1½" Conomatic
Band Saw: DoAll Zephyr 36"
Band Saw: #8 Marvel
Filers—DoAll Band Filer
Filers—Grob Band Filer
Hacksaw: Marvel #6, #9; Peerless 6"x6"
Honer: Micromatic #H-1
Keyseater: Davis, Baker, M & M
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NILES-BEMENT-POND 144" heavy duty, M.D.

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AMERICAN Model 6-G Hyd. Rifle Broach, Late

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BARNES H-3, Hydraw, Hyd., Inverted
BARNES H-2, Hydram; Hydraulic; M.D.
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LeBLOND No. 2 Deep Hole, Late Type
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NATCO 2BL Multiple; Helosteel; PRT; M.D.
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BROWN & SHARPE No. 13 Spur, Bevel
CROSS No. 1 Tooth Rounder, Motor Drive
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FELLOWS No. 12M Involute Measuring Inst.
FELLOWS No. 13LS Lapper, Late Type
GLEASON 3", 12" straight bevel gen., Late
GLEASON 24", 37", 77", 96" Bevel Gear Planer
GLEASON 4, 6, 18 Bevel and Hypoid Tester
GLEASON No. 14 Hypoid Grinder, Late
GOULD & EBERHARDT 96H Hobber, M.D.
GOULD & EBERHARDT 18H Hobber, M.D.
NEWARK No. 5 Gear Hobber, 72" cap., P.R.T., DIFFERENTIAL INFEED, M.D.
PRATT & WHITNEY 10" Gear Grinder; hydr., Late

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GLEASON No. 12 Tool Sharpener, Late Type
HEALD 72AS "Gagematic" Internal, Late
HEALD No. 72A3, "Gagematic," Motor Drive
SHEFFIELD Micra-Form Grinder, Late Type
THOMPSON 6"x18" Auto., broach, M.D.
VAN NORMAN 639, Osc. Radius, Late Type

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PRATT & WHITNEY 14"x36" type "B"

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AMERICAN 36"x33' centers geared; M.D.
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MONARCH 16"x28" centers, geared, M.D.
MONARCH 22"x456", 3 carr. Tim. CM, M.D.
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NILES "Time-saver" 30"x50' Boring, Timken
NILES 48"x32' Centers engine; geared; M.D.
SPRINGFIELD 14"x43", 16"x24", Geared, M.D.

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CLEVELAND 12"x16" Centers, Cutter Reliever, M.D.
U.S. TOOL 810-B Cutter Reliever, Late Type

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CINCINNATI 0-8, 3-24 Simplex; Late Type
SUNDSTRAND No. 3, Rigidmit, Timken, M.D.
U.S. Model MM-1-G Automatic, Late Type

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HALL Style D, Planetary, Late Type
INGERSOLL 32x24x16' Planer Type, 2 hds., M.D.
INGERSOLL 30"x42"x12' Adj. Rail Slab, M.D.
SUNDSTRAND Model 3A Duplex 42" Feed, Late
TAYLOR & FENN #80 Duplex Spline, Late

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BETTS (CONSOLIDATED) 108"x84"x50', 4 hds. P.R.T., Box Table, DC Reversing, M.D.
BETTS (CONSOLIDATED) 84"x92"x16', 4 hds. P.R.T., Box Table, DC Reversing, M.D.
LIBERTY 48"x48"x16' 4 hds. vari-voltage drive—Late Type
LIBERTY 72"x48"x20' 4 hds. Convertible, openside, vari-voltage drive—Late Type
NILES 108"x84"x42', 4 hds., Rapid Traverse, Box Table, D.C. Motor Drive

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RADIAL DRILL, CARLTON, 5', 15" col. '35
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LATHE, BRADFORD, 14"x6', new 1942
GRINDER, CINCINNATI CENTERLESS 22, new 1942
GRINDER, NORTON, 12"x36" UNIVERSAL, 1940
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Gisholt Nos. 3 & 5 Turret Lathes
Pratt & Whitney Keller Type "G"
Norton 6" x 30" Cyl. Grinder Hyd. Table & Wheel Head Traverse
H & W 10" x 48" Thread Miller
Jones & Lamson 7B Turret Lathe, with Cross Sliding Turret

CAPITOL MACHINERY CORP.
197-199 MOTT STREET
NEW YORK 12, N. Y.

MACHINERY VALUES
PRESSES

No. 3 Toledo OBI Punch Press, Cap. 22 ton.
No. 4 McDonald OBI Punch Press, Cap. 42 ton.
76½ Bliss 190 Ton Trimming Press.
No. 52 Bliss Straight Side Press, Cap. 44 ton.
No. 13 Toledo Horn Press.
2—No. 162 Bliss Punch Presses with Bullet Drawing Attachments and Feeds.
Ferracute Model DDG-55 Double Action Cam Drawing Press.

FORGING MACHINES

No. 10 Buffalo All Steel Bar Shear — Cap. 3½" round—3" square.
2—1" National Upsetting & Forging.
2" National High Duty Upsetter—Suspended slides.
1—5" National Upsetting & Forging Machine —Suspended slides.
2000 lb. Steam Drop Hammer.

OTHER MACHINERY AVAILABLE WRITE YOUR NEEDS

STROM-JOHNSON MACHINERY COMPANY

8810 S. VINCENNES AVE.
CHICAGO 20, ILLINOIS

LEAF BRAKE

12'x¼" DREIS & KRUMP. AC MOTOR DRIVE.

WEST PENN MACHINERY COMPANY
1210 House Bldg. Pittsburgh, Pa.

FOR SALE
ROTO FINISH TUMBLING BARREL

Wood lined, 5 compartment, Model AW60-5 Complete with 3 H.P. 220 Volt 3 phase 60 cycle Reversing Type Motor including Magnetic Brake. Machine in good condition.

TRENT ENGINEERING COMPANY
EAST TROY, WISCONSIN

Latest Types — Guaranteed Machine Tools 1941-1950 Models

BORING MACHINES—PRECISION

BARNES: No. 412 Horizontal, 60" travel

BROACHING MACHINES

CINCINNATI: 2-36 Vertical Broach, 2 ton, 36" stroke

CAM MILLERS & GRINDERS

SUNDSTRAND: #96 Double Head Miller for cylindrical cams
VAN NORMAN: Contour Miller 10CT
MOREY: 12M 2-Spindle Profiler, 12¾"x15" table
HEALD: 172 Sizematic Grinder for cylindrical cams

DRILLING MACHINES

AVEY: No. 2 Deep Hole Drill, 16" stroke—hydraulic
LELAND-GIFFORD: No. 2LMB Deep Hole
BARNES: 2011¼ 2-spindle on 3-spindle base
BAKER: 30HO 2-spindle inverted, hydraulic, deep hole, 4" dia. x 52" stroke
BAKER: 217 Upright Heavy Duty, 2" capacity
FOSDICK: No. 4BM Upright, High Speed
PROVIDENCE ENG.: FV-8 Sensitive 6-motor-spindle, ⅜" capacity
PRATT & WHITNEY: ½B x 50 Deep Hole Reaming Machine
ALLEN: #2 High Speed
ARCHDALE: Radial, all sizes (New)
WALKER-TURNER: D950, ½" capacity, bench type (New)

ENGRAVING MACHINES

DECKEL type—3 dimensional (New)
GORTON: 3U & 3Z, 2 dimensional
GORTON: 3B, 3 dimensional

GEAR CUTTING MACHINES

BARBER-COLMAN: No. 3 Hobber
BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 1¾ D.P. capacity
FELLOWS: 61A Shaper, 18" dia. capacity
FELLOWS: 64A Shaper, 18" dia. capacity
FELLOWS: 7 Shaper, 7" dia. capacity
FELLOWS: 72 Shaper, 7" dia. capacity
FELLOWS: Straight Line Generator, 3" dia.
GLEASON: #12 Rough & Finish Generator
GLEASON: 3" Straight Bevel Gear
HAMILTON: No. 1 Hobber, 6" diameter
SYKES: Gear Shaper 14" external, 20" internal
SYKES: Rack Cutting Machine 24" long

GEAR FINISHERS & TESTERS

FELLOWS: 8LSI and 13LSI Gear Lappers. External & Internal Spur and Helical
FELLOWS: No. 12-C Spacing Tester
GLEASON: No. 13 Universal Tester
GLEASON: No. 4 and No. 6 Bevel Gear Testers, Hand and Power Operated
GLEASON: 2" Bevel Gear Tester

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 23, capacity 10"x 48", plain
CINCINNATI: 6"x18" Hydraulic
CINCINNATI: 10"x36" Hydraulic
LANDIS: 10"x32" Type "D" Crankpin, Hydraulic
VAN NORMAN: #666 Crankshaft Regrinder
NORTON: 6"x18" & 10"x18"
NORTON: 10"x18" 45° angle wheel head

GRINDERS—GEAR & SPLINE

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH.: GG-18, 10"x24" Hydr. Spur Gears and Splines, also internal
GLEASON: No. 17 Spiral, Zerol & Hypoid, capacity 23½ P.D.

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
BRYANT: 112 Universal, Hydraulic
BRYANT: 16C16 Hole, Hydraulic
HEALD: 70A Plain
HEALD: 72A3, 72A5 Plain and Univ.
HEALD: 72A3 Sizematic Centerless
HEALD: 72A5 T-bed, Universal
HEALD: 172 Sizematic for cyl. cams

GRINDERS—RADIUS

VAN NORMAN: No. 73, 639, 649
VAN NORMAN: No. 3½ Universal

GRINDERS—SURFACE

ARTER: A-1—6" Rotary
ARTER: A-3—12" Rotary
THOMPSON: 8"x12"x18" Type B
HEALD: 8" Rotary
HEALD: No. 22 Rotary—12" Chuck
GARDNER: 120A Opposed Head Disc, 20" dia. abrasive wheels and 34" dia. rotary work carrier

GRINDERS—THREAD

EXCELLO: No. 31 external, dia. 5"x18" centers
EXCELLO: No. 33 external, dia. 6"x18" centers
JONES & LAMSON: TG-1245 External, 12" dia. x 45" centers, with additional capacity if required

HONING MACHINES

BARNES: No. 308H Vertical, 24" Stroke
MICROMATIC: H-510 Double End Horizontal
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia. capacity

LAPPING MACHINES

FELLOWS: 8LSI and 13LSI Gear Lappers
NORTON: No. 26 Hyprolaps
SCHRANER: Model A External Cylindrical Lapper—6 heads

LATHES—PRODUCTION

LIPE-ROLLWAY: 12"x30" Carbomatic, hydraulic feed
LODGE & SHIPLEY: No. 3A Duomatic
MICHIGAN: #1708 and 1712 Relieving
BLOUNT: HB Polishing, 12"x48"
WILLSON: 15"x48" Geared Head Motor Driven (New)

LATHES—TURRET

BULLARD: 24", Vertical
WEBSTER & BENNETT: Vertical Turret Lathes, 36" and 48" dia. (New)
GISHOLT: #2L Saddle Type, Extended bed, 24" extra length
HERBERT: Turret Lathes, all sizes (New)

MILLING MACHINE

CINCINNATI: 2-spindle Vertical Hydrotel with two rotary tables of 36" dia.
CINCINNATI: No. 4 Vertical
REED-PRENTICE: #5 Vertical 16"x60" table
SUNDSTRAND: 96 Rigidmil-Duplex (for milling cam tracks in propeller hubs or similar)
SUNDSTRAND: No. 0 Rigidmil
MOREY: 12M 2-spindle Profiler, 12¾" x 15" table
TAYLOR-FENN: M-80 Duplex Spline
TAYLOR-FENN: Vertical 6"x21" table with power feed, high spindle speeds
RICE-BARTON: Duplex Spline
VAN NORMAN: Contour Miller 10CT

SAWS & CUT-OFF MACHINES

MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9¼" cut-off Saw with Auto. Stock Feed (New) Hydraulic
CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
WILLIAMS: 10" Pipe & Tube Cut-Off

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread
LEES-BRADNER: LT 6"x36" Thread
LEES-BRADNER: 40A Thread Miller
MOREY: 12"x60" Thread Miller
MURCHEY: No. 22 Tapper, Horizontal, ½" to 2½" dia. capacity
NATCO: Vertical Tapper 16 spindle
PRODUCTO: Hand Tapper

TOOL SHARPENERS

OLIVER: 2A Face Miller Grinder
OLIVER: 510 Drill Sharpener
OLIVER: 10" Tool Bit-Template
FELLOWS: Flat Top Helical Gear Cutter
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New), Automatic Indexing
WALKER-TURNER: Bench Grinder, ½ HP

MISCELLANEOUS

BAR POINTER & CHAMFER: Kent 3¼"
CUT-OFF: Campbell, Abrasive 425 Cutalator, 4½" dia. capacity
CUT-OFF: Pipe & Tube, 10" Williams
DIE SINKER: Reed Prentice No. 5, 16" x 60" table
GRINDER: Walker Turner ½ HP, Bench Type
LATHES: Blount Polishing 12"x48"
PRESS: Screw, Gen. Flex. 3 ton
RACK CUTTING MACHINE: Sykes 24" long
RIVETER: Gen. Engr. 24" throat
TEST STAND: Denison 918-AM Hydraulic
SHAPER: 16/20" Edgwick (New)
PUNCH SHAPER: Sentinel Shrewsbury (New)

TRIPLEX MACHINE TOOL CORP.

Machine Tool Engineers since 1919

75A WEST ST. **Phone: HAnover 2-4520** ***Cable Address:*** **"TRIMACTOOL"** **NEW YORK 6, N. Y.**

OUT-OF-THE-ORDINARY OFFERINGS

? Do these items meet your requirements ?

MODEL 226-30 BESLEY OPPOSED DISC GRINDER
Dia. of wheels 30". Max. opening between wheels 28". Friction Power Feed. Two (2) 20 H.P. motors and coolant.

YODER M-31 CAM OPERATED BENDER
Designed to bend inconsistent or irregular sweeps longitudinally in extruded or roll formed sections. Automatic and hand controls of bending shoe. Roll spindle dia. 3". 10 HP variable speed drive.

KANE & ROACH MODEL ILS BENDER
Designed to bend stock up to 12" wide within limits of machine. Pyramid Type arrangement. Roll shafts 3" dia. Will take rolls for flat, angles, special shapes, etc. 5 HP motor drive.

No. 6 DEFIANCE 4½" BORING MILL
Table 42"x75". Maximum distance from table to spindle 60". Max. distance from spindle to outboard support 120". 10 spindle speeds. 12 feeds. 10 HP motor drive.

No. 6 CINCINNATI CENTERLESS GRINDER
work cap. approx. 12" dia. Single or Multiple Grinding Wheel cap. up to 36" dia. x 36" wide. Filmatic Bearings.

SUPER SPEED PRESSES
Made by Ferracute Machine Co. 10 & 30 ton (2 available). Adjustable stroke. Infeed and outfeed rolls. Variable speed drive. Designed for extremely high production of blanked and shallow formed parts.

HIGH PRODUCTION PRESS
No. 645B Bliss. 65 ton cap. Double Crank. Tie Rod Construction. 1" stroke. Bed area 36"x18½". Shut height 10"; Infeed and outfeed rolls. Scrap cutter. 5 HP motor drive.

THREAD GRINDER
No. 101 Sheffield Precision Thread and Form Grinder. Capacity: 7" dia. x 12" length. Uses crusher roll to true grinding wheel.

BATTERY OF HYDRAULIC MILLS
Six (6) Handmills converted to hydraulic longitudinal table feed. Hydraulic cylinder on each Mill with Vickers controls. One pump furnishes pressure for all six mills. Each spindle driven by 1 HP motor.

Many other Special and Standard Machines in our Stock. Let us know what you need. We can help you fill your requirements.

MACHINERY LIQUIDATING COMPANY

2671 MICHIGAN AVENUE **Phone: TAshmoo 6-6650** **DETROIT 16, MICHIGAN**

These advertisements

are current, live opportunities in the metal-working field.

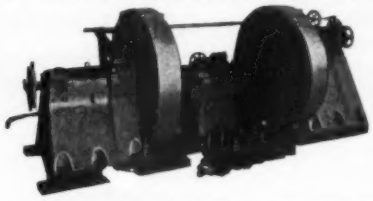
Each advertisement represents a current Want or Offering of an orgc.nization or individual in this field, with some element of profit in each for whoever can fill the need. Some have money-saving possibilities, others are opportunities for more business; many are employment opportunities; still others offer property, or equipment used or surplus new equipment.

"Searchlight" advertisements are constantly changing. New opportunities are finding their way into this great Want medium each issue. Regular consultation of the "Searchlight" pages can be as important to you as reading the text pages of each issue; Text matter is news of progress and development in the industry, "Searchlight" advertising is news of current "Opportunities" in this industry.

for EVERY business WANT
"Think SEARCHLIGHT first"

EMERMAN *Offers from* STOCK
FOR PRODUCTION—LATHES

90" x 22" PUTNAM HEAVY PATTERN DRIVING WHEEL LATHE



With: Calipering attachment; journal attachment; and quartering attachment

Arranged for chucking locomotive driving wheels.

Face plates with 3 Putnam non-slip driving dogs.

Capacity of lathe: 90".

Minimum and Maximum of engine for which quartering may be done 24" to 36".

Direct connected motor drive with 50 H.P., 7½ H.P., 3½ H.P., 230 volt D.C. motors and controls.

Approximate weight: 116,000 lbs.

No. 4FU FOSTER FASTERMATIC AUTOMATIC TURRET LATHE

Swing: Over bed 35½"; over cross slide 20".

Head: Spindle speeds 9 to 484 R.P.M.

Diameter hole through spindle 5⅛".

Timken bearing spindle.

Cross Slide: Width 10"; length 25".

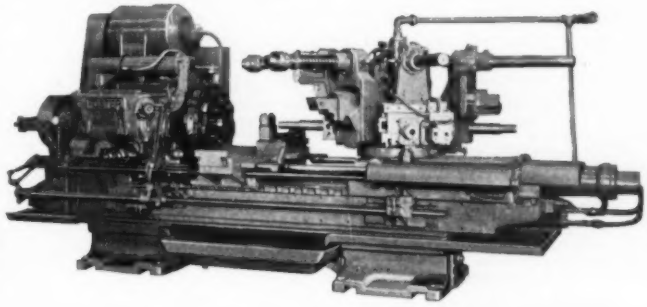
Maximum cross travel 6".

Maximum distance spindle nose to turret face 59½".

Hardened ways.

Motor Drive: Motor drive w/20 H.P. motor and controls.

NOTE: 4F Foster Fastermatics PLATEN TYPE, hardened ways, same speeds and feed as above machine, except equipped with platen instead of turret. Excellent condition. Many available.



EMERMAN MACHINERY CORP.

875 W. 120th STREET — CHICAGO 43, ILLINOIS

ALL LATE TYPE

Lathe, Engine, Mackintosh-Hemphill, 72"/110"x30' centers, factory rebuilt, like new; Weight 90 Ton.

Turret—Midland ‡5, bar & chucker

Turret—Oster ‡601WD, 1½" collet

Shear—Sq., Famco Power 36"x18 G, New

Shear—Rotary—Quickwork ‡50A, Circle Cutter & Slitter 48"x¾"

Rolls—Forming, Farnham 6' (aircraft)

Spot Welder—75 KVA

Induction Heater—Lepel 7½ KW

Thread Mill—Morey 12"x10' centers, Int. & External.

KINGS COUNTY MACHINERY EXCHANGE

408 Atlantic Ave., Brooklyn, N. Y.

TRiangle 5-5237—Dept. "A"

SCARCE MACHINE TOOLS

No. 0 Vernon Plain Horizontal Mill, late

No. 10 Brown & Sharpe Automatic Mill, late

No. 2 Brown & Sharpe Vertical Mill, late

No. 3VG Reed Prentice Vertical Mill, late

No. TG-615 Jones & Lamson Hy. Thread Grinder (1942)

No. 72A5 Heald Plain Cylindrical Grinder, late

No. 2 Cincinnati Centerless Grinder, serial H20230

10"x18" Landis Hy. Plain Grinder, late

No. 2 Brown & Sharpe Universal Grinders, late

No. 2 Warner & Swasey G.H. Turret Lathe, serial 580374

No. 4A Warner & Swasey G.H. Turret Lathe, ser. 292,000

12"x63" Fay Automatic Lathe, 1940

8½" x 8" Goss & deLeeuw Chucker

16"-17½" x 84" Porter McLeod Engine Lathes, late (2)

4½" Model A Cleveland Automatic

9/16" Model DA2 Davenport Automatic

No. 00, No. 0, No. 2 Brown & Sharpe H.S. Automatics

No. 6 Brown & Sharpe Automatic Screw Machine (2)

No. 2, No. 3, No. 4, No. 4½ O.B.I. Punch Presses

No. 1R Bakewell Radial Tapping Machine, late

MACHINE TOOLS

TELEPHONE TAylor 9-8200

LAKE MACHINERY COMPANY

942 WEST LAKE STREET • CHICAGO 7, ILLINOIS

AUTOMATICS
⅞"-1 1/16" Cleveland 4 spdl.
2" Model B 18" Cleveland
No. 454 New Britain Chucking
14"x19" Fay

BORING MILLS
84" Gisholt
100" Niles-Bement-Pond
2½" Cleveland horiz., long bed
3" Rockford
4" Detrick & Harvey floor type
No. 5D Moline 6 spdl. cylinder bore

DRILLS
20" & 24" Barnes all geared self oiling
21" & 24" Cincinnati
Nos. 121, 217, 310 & 315 Baker
No. 217H Baker horizontal
Barnes horizontal radial
3' Carlton sensitive radial
4' Cinc. Bickford univ. radial
6'-15" Dreses radial
16 spindle No. 13 Natco multiple
4 spindle No. 4 Foote Burt rail
6 spindle No. 17 Foote Burt rail
1 & 4 spdl. Avey No. 2, woodpecker feed
No. 410 Barnes 2 spdl. rifle drill
7 spdl. Moline horiz. hydr.
6 spdl. Moline 5D Borer

GEAR CUTTERS
Nos. 6 & 7125A Fellows shapers
Nos. 8H, 12H, 16H5, 18H G. & E.
No. 130 Cleveland Rigidhobber
No. 5A Lees Bradner hobber
4" Gleason spiral bevel
Gleason testers & lappers
Illinois involute tester
Red Ring shavers, lappers & speeders

GRINDERS, CYLINDRICAL
6"x18", 10"x18" Landis hydraulic
10"x24" & 16"x72" Landis mechanical
14"x36" Landis hydraulic universal
10"x36" Norton semi-automatic
10"x18", 10"x30" & 10"x50" Norton mech.

GRINDERS, INTERNAL
No. 75A Heald hand feed
Nos. 72A3 & 72A5 Heald
No. 72A3 Heald, cross sliding, head
No. 72A3 Heald Sizematic
Model MH1 Sav-Way
Grenby bench type

GRINDERS, SURFACE
Nos. 10 & 16A2 Blanchard rotary
12" & 16", No. 22 Heald rotary
16", No. 25 Heald hydr. rotary
8" Pratt & Whitney rotary (tub)
14"x36" Pratt & Whitney vertical
8"x24", No. 78 Wilmarth & Morman
8"x22", No. 3 Abrasive

MILLERS
No. 2A & 2AS Milwaukee
No. 2 Cincinnati, horiz. & vertical
No. 3 Ohio
12" Cincinnati Plain Mfg.
No. 1H-12" Kearney & Trecker
18" & 24" Cincinnati plain automatic
18", 24" & 48" Cincinnati duplex
No. 31 De Vlieg Supermil
No. 1-8 Kent Owens hydraulic
Nos. 1, 2 & 3 Kent Owens hand
No. 1 Kent Owens semi-automatic
20"x84" table Ingersoll vertical
Ingersoll Rise & Fall
6 spindle Moline profiler
24"x18"x14' Ingersoll planer
48"x24"x22' Ingersoll planer
30" Newton rotary
30", 42" & 84" Ingersoll rotary

SHAPERS & PLANERS
20" G. & E. shapers
24" Columbia univ. shaper
16" Bement Miles slotter
36"x36"x8' Gray planer

MILES MACHINERY CO.
Box 770 SAGINAW, MICH.

LATE MODEL TOOLS

LATHES
12"x30" MONARCH Model CK Toolroom
14"x54" L & S Selective Geared Head Lathe

AUTO. LATHES & TURRETS
No. 2 B & O Geared Electric Turret Lathe
12"x21" J & L (Fay) Auto. Lathes
20"x25" J & L (Fay) Auto. Lathes
No. 5DE POTTER & JOHNSTON Auto. Turret Lathes
No. 4 GISHOLT Ram Type Univ. Turret Lathe

MILLING MACHINES
No. 2S VAN NORMAN Ram Type Univ. Miller
No. 2KM KEARNEY & TRECKER Vert. Miller
36"x36"x16' INGERSOLL Adjustable Rail Planer Type Miller, 40 HP AC Motor Drive, One Rail Head, Two Side Heads.
No. 0S CINCINNATI Plain & Vert. Auto. Millers

GRINDERS
No. 2 CINCINNATI UNIV. Tool & Cutter Grinder
6"x18" LANDIS Type C Plain Grinder
10"x18" LANDIS Type C Plain Grinder
10"x24" LANDIS Type C Universal Grinder
6"x18" NORTON Vert. Spdle Surface Grinder
14"x16"x60" MATTISON Hyd. Surface Grinder
16"x96" LANDIS Type B Plain Cyl. with Gap Bed
No. 5 BROWN & SHARPE Pl. Cyl. Grinder, 3"x18"
No. 16/28 BRYANT Hyd. Internal Grinder
No. 174 HEALD Hyd. Gap Internal Grinder

DRILLS
No. 2LMS LELAND GIFFORD 2-spindle on 4 spindle base
No. 3MS LELAND GIFFORD 2-spindle, hydraulic feed
No. H-3 BARNES Single Spindle HYDRAM Drill

GEAR EQUIPMENT
No. 725A FELLOWS High Speed Gear Shaper
No. 145 CLEVELAND Rigid Hobber
No. 36BM GOULD & EBERHARDT Gear Rougher

MISCELLANEOUS
No. 25-RT G & L Horizontal Boring, Drilling & Milling Machine
16" GEMCO Shaper, M.D.
20" STEPTOE Shaper, Ulv. Tanble
No. ½B P & W Two Spindle Reaming Machine, 1944
4½"x36" PRATT & WHITNEY Model C Thread Miller
Model H-1 MICROMATIC Hydrohoner
6" TAYLOR & FENN Spline Millers
⅞" CONOMATIC 4-spindle Auto. Screw Machines

WIGGLESWORTH INDUSTRIAL CORP.
203 Bent Street
Cambrdge 41, Mass.

TEMPERATURE RECORDERS
27—Used Leeds and Northrup Indicating and Recording Micromax Recorders Model "S" Automatic motor driver self-contained flush mounting.

DALTON SUPPLY CO.
2829 Cedar St. Phila. 34, Pa. GArfield 6-1800

MACHINERY FOR SALE

#35L Excello
THREAD GRINDER
Excellent Condition
Price.....$12,500.00

FAIRFIELD EQUIPMENT CO.
100 Sanford St. at R.R.Station FAIRFIELD,CONN.

COMBINATION DRILLS & COUNTERSINKS
High Speed

Size	Price Doz. Net	Size	Price Doz. Net
A-1	$ 6.00	J-1	$13.50
C-2	6.00	J-2	13.50
D-1	6.00	M-1	18.00
E-1	6.00	M-2	18.00
E-2	6.00	N-1	24.00
F-1	9.00	N-2	24.00
F-2	9.00		

Semi High Speed

Size	Price Doz. Net	Size	Price Doz. Net
C-2	2.00	F-1	3.00
E-1	2.50	F-2	3.00

VICTOR MACHINERY EXCHANGE, Inc.
251 Centre St. New York 13, N. Y.
Canal 6-5575

TOOLING FOR SALE

We have a large amount of surplus Tooling for #3, 4, 5, 1A and 1L Warner & Swasey and Gisholt Turret Lathes. Tooling consists of Single and Multiple Roller Turners, Slide Tools, Circular and Dove Tail Form Tool Holders, Necking Tool Blocks, Square Turrets, Master Collets, Collet Pads, Etc.

ROBY MACHINE WORKS
Truro, Iowa

HYDROMATIC MILLER

CINN. 4-48 HEAVY BUILT IN HOIST 1942

Lathes, Millers, Shapers, Grinders, Gear Machines, modern type.

TOBACCO MACHINERY CORP.
Tel.—Richmond, Va. 82-6562

1—BRYANT #16 INTERNAL GRINDER SERIAL #P-5767

1—FEDERAL SPOT WELDER TYPE AR-36-SA WITH PANEL BOARD CONTROL FOR ALUM. SERIAL #10287

1—DRILL PRESS. CINCINNATI-BICKFORD 36", SINGLE SPINDLE SERIAL NO. E347. OUR NO. 1131.

1—COILING MACHINE. FLAT RING. SLEEPER & HARTLEY NO. 3. SERIAL NO. 577. OUR NO. 2048

CENTURY ELECTRIC CO.
1806 Pine St. St. Louis, Mo.

Eastern Rebuilt Machine Tools

THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

ARBOR PRESSES

No. 37E Wilson Hydraulic, hand operated, cap. 50 tons, new
No. 3 Famco Bench Type, 3 tons pressure
King Screw Press, s.p.d.

AUTOMATICS

Cone No. 438 Automatic, m.d.
4 spindle 1¼" Conomatic, m.d., bar, 1942 machine
No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.
14" Fay Flanders Type, m.d.
4 spindle 2¼" Cleveland Model "K", m.d.
2¼" Gridley Single Spindle, m.d.
2½" Cleveland Model A, m.d.
4½" Cleveland Model A, m.d.
5½" Cleveland Model A, m.d.
6" Cleveland Model A, m.d.
7¾" Cleveland Model A, m.d.

BOLT THREADERS

¾" Style R Economy Automatic Threading Machine, belt
Victor Nut Facing Machine, m.d., cap. ⅜" to 2" nuts

HORIZONTAL BORING MILLS

3½" bar Landis Floor Type, m.d.
4" bar Detrick & Harvey Floor Type, m.d.
5" bar Barrett, m.d.
5½" bar Niles, m.d.
10" bar Sellers Floor Type, m.d.
Pair tables for use on Floor Type Horiz. Boring Mill, 8'0" long x 17½" wide x 38" high, 2 T slots
Floor Plate 76" wide, 21'6" long overall, 9" thick, 5 T slots
Pair tables for use on Floor Type Horiz. Boring Mill, 8' long x 15¾" wide x 33" high, 2 T slots

VERTICAL BORING MILLS

24" Bullard New Era, m.d., with side head
30" Bullard, 5 station turret head on cross rail, fixed rail type, old
42" Colburn, m.d., 1 swivelhead, 1 turret head, p.r.t.
42" King, belted m.d., 2 swivel heads, p.r.t.
48" Putnam H.D., m.d., 2 swivel heads
100" Niles Heavy, m.d., p.r.t.

BROACHING MACHINES

75 H.P. LaPointe Hydraulic Broach, m.d.
Cincinnati Mill Broach, m.d., 10" spindles, new

BALL BEARING DRILLS

Lanedy-Otto Bench Type, 8" overhang
Allen Bench Type, m.d., ½ H.P. motor, 12" overhang
Automatic Sensitive, m.d., ½" cap.
Mason Bench Type Single Spindle, belt
Providence Engineering Co., Model E, s.p.d.
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 2 Avey Style MA1, arranged for horizontal operation
No. 2—12" Foote-Burt Single Spindle, m.d.
No. 4 Fosdick, 6" overhang, belted m.d., No. 2 Taper
No. 5M-16" Fosdick, m.d.
1 spindle Allen, belt drive
2 spindle Allen, belted m.d., 6" overhang
2 spindle Avey, size No. 1, Type B, style VHP, m.d., 8" overhang
2 spindle No. 3 Avey, belted m.d., p.f.
2 spindle No. 4BM Fosdick High Speed, m.d., 12" overhang, No. 2 Taper
3 spindle No. ½ Avey Heavy, direct m.d., latest
5 spindle No. 3 Avey, belted m.d., No. 3 Taper, 12" overhang
5 spindle Leland & Gifford, No. 2 Taper, m.d. on each spindle
6 spindle No. ½ Avey, model MA6, m.d., latest
6 spindle No. 2B Edlund, m.d., No. 2 Taper
6 spindle No. 3 Avey, belted m.d.
6 spindle Henry & Wright, m.d., 15" overhang, No. 2 Taper

HORIZONTAL DRILLS

No. ½ Bx30" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. ½ Bx50" Pratt & Whitney Gun Barrel Rifling Machine, m.d., latest
No. 1Bx74" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d., latest
No. 1½x105" Pratt & Whitney 2 spindle Deep Hole Drill, m.d., latest
No. 1½x105" Pratt & Whitney 2 spindle Gun Barrel Rifling Machine, m.d.
No. 1 Pratt & Whitney 2 spindle Deep Hole Drill, belted m.d.
No. 1½ Pratt & Whitney 2 spindle, m.d., older type
Pratt & Whitney Rifling Machine, belt
5 spindle Detroit Semi-Automatic Drill, belt
2 spindle No. 410 W.F. & John Barnes Deep Hole Drill, m.d.
Special Horiz. Drilling Machine, Cincinnati-Bickford Head mounted horizontally on base

MULTIPLE SPINDLE DRILLS

No. 3 Baush, m.d., 16x30" head, 15 spindles
No. 3 Baush, m.d., 20x40" head, 15 spindles
No. 16 Foote-Burt Fixed Center, m.d.
3 spindle 24" Barnes All Geared Self-Oiling, m.d.
3 spindle 12" Rockford Gang, m.d.
4 spindle Foote-Burt Rail No. 4 Taper, m.d.
6 spindle Niles-Bement-Pond, m.d., 12' rail, No. 5 Taper

RADIAL DRILLS

3' American Sensitive, cone
6' American Triple Geared Plain, 13" col., m.d., gear box on base
4' —12" Fosdick Plain, m.d. on base
6' —13" Cincinnati-Bickford Super-Service, latest
6' Niles-Bement-Pond Semi-Universal, m.d.
7' —17" Dreses, gear box, m.d.

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BOLT THREADER, 1½" Williams Reliance
BORING MILLS, 100" & 60" Cincl., 2 Hds., P.R.T
BORING MILLS, 3½" & 4" bar Landis Floor (3)
4½" bar Niles table, Dual Control
BORE-HONE, Barnes, 10 stroke, 9" bore, '42
BRASS LATHE, 21" Acme, Late, Hardened Ways
RADIAL, 5'12" col. Amer. Trip. Purp., M-on-arm
DRILL, 28" Colburn No. 6, 3" capty. 15 H.P., AC
DRILL, 25" Weigel, Tapping, M.D.
DRILL, 24" Colburn #14, Comp. Tble. 2" capty.
GEAR GENERATOR, 5" Gleason, Late
GEAR HOBBER, 36H Gould & Eberhardt
GEAR HOBBER, #12 Barber Coleman
GEAR PLANER, "11" Rieneckor, Bevel
GEAR SHAPER, No. 75 Fellows High Speed 6IA, 6H & 6IA, 6 Fellows
GRINDERS, 20"x120" Landis, Cyl., Hyd., AC
GRINDER, 10"x48" Cinc. Cyl., M.D.
GRINDER, No. 6-T Sellers, Tool, '42
GRINDER, No. 16Y2B Bryant, Int., 1943
GRINDER, No. 174 Heald Gap, Int. 54" sw., '42
GRINDER, No. 72AS Heald Internal, 1943
GRINDER, No. 75A Heald, Int. Hand Feed
GRINDER, Micro-Internal, Large
GRINDER, SURFACE, 13"x48" Hancott Vert. Spin; No. 18 Blanchard, 20" Chuck
GRINDER, UNIV. 12"x36" Thompson M.D.
LATHES, 50"x15' Cen. Niles, blocks to 66", M.D.
48"x20'0" cen. Simmons, like new, '42
LATHE, 42"x31' cen. Putnam Grd. Hd.
32"x25' cen. Sommerfeld, 2 T.A., 2 carr., '42
22"x24¾"x48" cen. Skoda, New
20"x48" cen. American, T.A., (2)
No. 16 LeBlond Pro. 20" sw. x 30" cen.
TAPPERS, Nos. 1 & 2 Bakewell (4)
TURRET LA., 20" Libby "C" 4½" capty.
No. 1B Foster Univ., 2" capty. (2)
No. 2B Foster Univ. 3¼" capty. Bar.
RIGID-MIL, 90" Sundstrand, Tble. 30"x120"
THREAD MILLER, 12"x60" Morey Shields, '42
MILLER, UNIV., No. 2A B. & S., M. In base. Timken Nos. 2 & 3 Cincl. Pl. Cone Motorized
MILLER, VERT., No. 4 Cincl. Hi Power, M.D.
MILLER, HORIZ., No. 2 Stand. K.&T., M-in-base
NIBBLER, 36" Gray-Savage #236
PIPE THREADER, 2" Landis, AC, M.D.
PLANER, 48"x36"x8' Cincl. 4 Hd., Box, PRT, Force Feed
SHAPERS, 24", 20" & 18" G. & E., AC, M.D.
22" & 16" Hercules, Univ., New
30" Mortas, Draw-Cut M.D.
SLOTTER, 20"—24" Dill, M.D.

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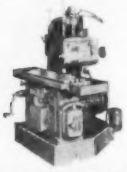

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- No. 3 WARNER & SWASEY Ram Type Universal Turret Lathe, serial 529000, new 1940, bar feed & tooling
- No. 4 GISHOLT Ram Type Universal Turret Lathe, bar feed, chuck and tooling, new 1942
- No. 5 GISHOLT Ram Type Universal Turret Lathe, preselector head, bar feed, chuck & tooling, new 1942
- No. 7 FOSTER Ram Type Universal Turret Lathe, 2½" bar capacity, bar feed and tooling
- No. 2L GISHOLT Universal Saddle Type Turret Lathe, preselector head, bar feed, chuck & tooling, new 1942
- No. 3A WARNER & SWASEY Saddle Type Turret Lathe, serial 571000, new 1941
- 24"x21' bed LODGE & SHIPLEY Selective Geared Head Lathe, 2 carriages, 25 HP motor, new 1941
- 4" bar LUCAS Table Type Horizontal Boring Mill, new 1941
- 100" BERTRAM (Niles Patterns) Vertical Boring Mill, 2 heads on rail, rapid
- No. 3K KEARNEY & TRECKER Vertical Mill, No. 50 taper, spindle speeds to 1200 RPM, rapid traverse, motor inside base
- 4'-13" column CINCINNATI BICKFORD Super Service Radial Drill, AC motor on arm, power rapid traverse
- No. 4BM FOSDICK Single Spindle Drill, No. 3 Morse taper, 1942
- No. 2 THOMAS Horizontal Angle Rolls, capacity 3" x 3" x ⅜", AC motor, new 1945

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#140 Cleveland Gear Hobber.
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#7125A Fellows Gear Shaper, High Speed

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- 200 Ton Verson, #40FS, Punch Press, 30" stroke, 35 x 37 bed.

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#24A2 Hanchett Two Spdl. Vert. Surface Grinder.
24x68", and 26x72" Norton 0.0 Grinders
#3R Gisholt Turret Lathe. 5" Capacity
#R-14 Lo-swing Production Lathe
#12 Van Norman Universal Mill

- #1½ Yoder Roll Former, 8 Spdl, 1½" Shaft dia. x 6½" Max. length flat strip, latest, w/cutoff
- 60" McKay Roller Levellers, ¼" to 2" Cap. and ½" to 2" Cap., armor plate (2)

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Pratt & Whitney 14"x36" Surface Grinder New 1943
Ingersoll 24"x36"x18' Four Head Planer Type Miller with Slabbing Spindle, M.D.
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#35 Excello Thread Grinder
#61A Fellows Gear Shaper
#1A Warner & Swasey Chucking Machine

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NORTON 10"x96" Plain Cylindrical Grinder—MD
NORTON 20"x120", Self-Contained Cylindrical
HEALD #70A Internal Grinder (late type) 3 motor drive

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BLANCHARD #10 Hi-Power Vertical Rotary—16" Chuck
GARDNER #4, motor-on-spindle dble. end disc. Grinder, 23" dia. disc wheels

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LEBLOND #2 Gun Boring Lathe (1942 vintage)—used on 37 MM shells—swing over bed 18½"—hole thru spindle 5⅛"—10' stroke (excellent condition).

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AMERICAN 16"x6', 12 speed geared head, MD
PRATT & WHITNEY, Model "B" gr. head, 16"x 36" ctrs. motor-in-base.
PRATT & WHITNEY 16"x54" ctrs, Model "C", 18 spds to 1000 RPM, gr. hd. MD.
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FLATHER 20"x141" Ctrs. DBG, MD.
BOYE & EMMES 29"x192" ctrs. DBG—MD—swings 21"—cabinet legs taper atchmt.

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LATHE FEATURES OF THE MONTH

AMERICAN

36"x24', Internal Face Plate, geared head, Rebuilt
30"x32', 12 speed head
30"x12', Geared head
24"x8', geared head
18"x8', geared head
18"x8', 3 SCD bowl head, back geared
18"x6', Geared head
16"x8', High Duty, 3 SCD
16"x8', 3 SCD, Bowl head type
16"x6', High Duty, Cullman Drive

LODGE & SHIPLEY

27"x30', Lodge & Shipley, geared head
27"x18', Patent head
27"x14', 9" hollow spindle
24"x12', Selective geared head
20"x10', 5 SCD
20"x8', geared head
18"x9', Bowl head type, 3 SCD
18"x8', 5 SCD, single back geared
18"x6', Selective geared head
14"x6', 3 SCD, double back geared
14"x5', 5 SCD

LeBLOND

25"x12', heavy duty
24"x10', 3 SCD, double back geared
21"x8', 3 SCD, double back geared
17"x8', 3 SCD, double back geared
14"x6', 4 SCD, single back geared
#6 Multi Cut, swings 9"

HENDEY

18"x8', 4 SCD
14"x6', Model EBM geared leg
14"x5', 4 SCD, Yoke head type, drive all drive
14"x6', 4 SCD, Yoke head type

MONARCH

16"x8', 3 SCD, double back geared
16"x6', Motor on leg type
14"x6', 3 SCD, double geared

BOYE & EMMES

20"x8', 3 SCD, double back geared
18"x8', 3 SCD, double wall apron

MISCELLANEOUS LATHES

36"x24' Schumacher, Internal Face Plate drive
30"x10' Niles Timesaver Engine Lathe
26"x10' Walcott, 3 SCD, double back geared
Model B-3 Blount NEW 1941
19"x8' Sidney, Bowl head, 3 SCD
18"x6' Reed, 3 SCD, back geared
16"x8' Sebastian, 4 SCD
16"x8' Carroll Jamieson, Loose Change
16"x6' Davis, Cullman Drive
14"x6' Rockford, 3 SCD, double back geared
14"x6' Mulliner, 4 SCD, back geared
14"x6' Hamilton, 4 SCD, back geared
Model 918 Rivett Bench Lathe, swings 9", 1941
11" Sundstrand Stub Lathe

BORING MILLS—VERTICAL

King 34", Turret head, self contained, 3 SCD, 12 speed
Colburn 54", Two heads on rail
Bullard 44" Maximill
Niles Bement Pond 12'

BORING MILLS—HORIZONTAL

Universal 3½" bar, 16 speed
Cleveland #1, 2½" bar, single pulley drive
Barnes #3, 3" bar
P & H Floor type, 4" bar
Universal 5" bar, Model 40, tryway, LATEST TYPE

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Ingersoll 42x36x12', 4 head adjustable rail
Ohio 40" Tilted Rotary Miller
Cincinnati 12" Manufacturing Miller

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Cincinnati #4 Hi Powered, single pulley drive, single round overarm
Brown & Sharpe #5B, single pulley drive, single round overarm

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No. 2B Simmons Micro Spd., Late.
No. 3L Bisbolt 4⅝" Hole in Spind. Chuck, M.D.
Bullard 24" Vertical, New Era, M.D.
No. 5B N. B. Chuckers 10½" Cap.
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48"x34' Driggs Geared Hd., 12-speeds, takes 24' betw. centers, 3" H.S., plain change gears, with chuck jaws.

All machines in good serviceable condition and available for immediate shipment.

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Radial Drill, Fosdick 3'11" equal to new universal table, A. C. motor.
Milling Machine, B & S, #5, plain, with A. C., 20 HP Motor, V-Belt Drive.

GUYAN MACHINERY COMPANY
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Rivett No. 918 Second Operation Lathe.
Wiedemann Type R11R Punch.
No. 2 Press-Rite Presses, dial feeds, 1947.

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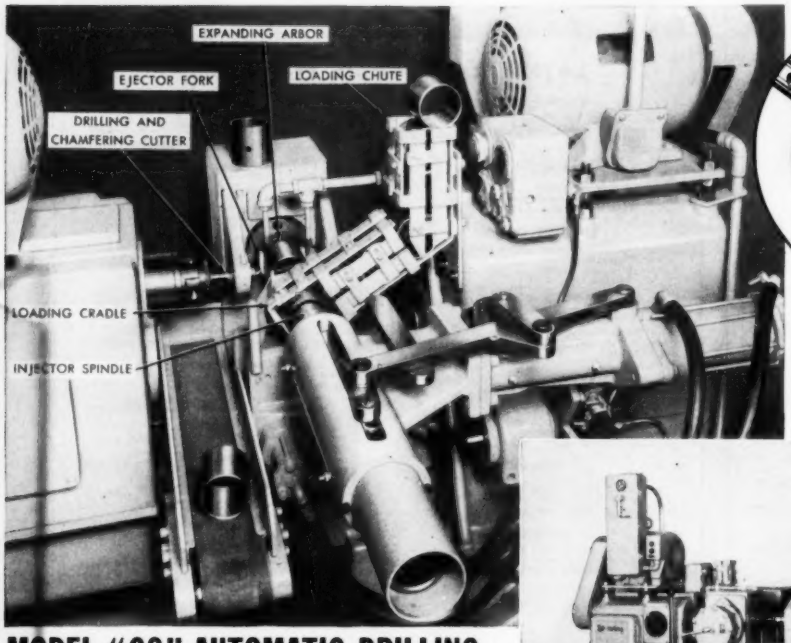
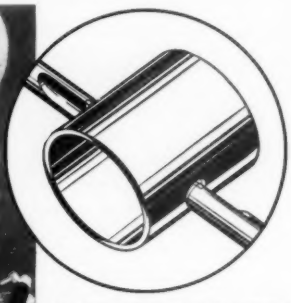
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

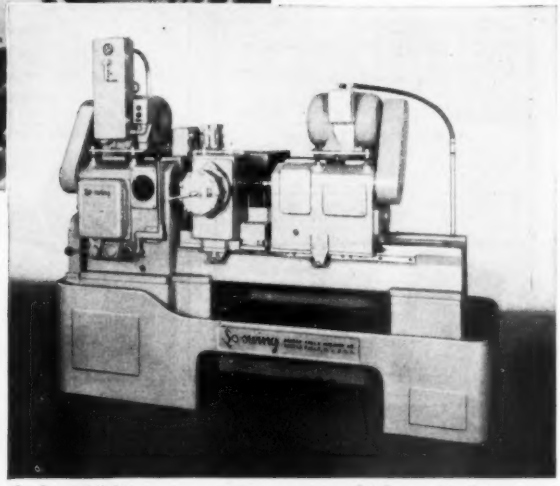




▲ *Schematic diagram showing application of two combination Drilling and Chamfering Cutters to work.*

◀ *Closeup rear view of machine with safety cover removed to show automatic loading mechanism.*

▼ *Overall front view of machine.*



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Solution: **The Model "CS" Automatic Drilling Machine selected for this job was equipped with two Drilling Heads and a combination holding, loading and ejection mechanism shown in upper illustration.**

In operation, the frames, which have been faced to length in a previous operation, are placed in the loading chute and fed by gravity to the loading cradle where they are picked up by the injector spindle and placed on an air-operated expanding arbor. The injector then retracts to clear the work and the two combination drilling and chamfering cutters advance in rapid traverse to the work piece; then slow down for the length of cutting stroke and finally return in rapid traverse to the starting position. The finished piece is automatically ejected by the ejector fork and falls on a moving conveyor which carries it to a tote box, and at the same time keeps the machine clear of chips.

The entire operation is automatic and controlled by cams mounted on a camshaft which synchronizes all machine and loader movements. The loading and unloading takes place during a short dwell milled in the drilling head cams. The operator simply loads the parts in the loading chute, the machine takes over from this point. Production is 600 pieces per hour at 100% efficiency.

Consult Lo-swing engineers about *your* machining problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

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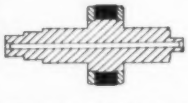
50 MILLS NOW USING Talide WORK ROLLS

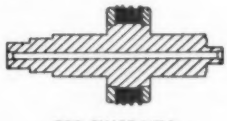
PHYSICAL AND MECHANICAL PROPERTIES OF TALIDE ROLLS	
Specific Gravity GMS/CC (Density)	14.8
Rockwell "A" Hardness (60 Kilogram Load)	91
Transverse Rupture Strength (psi)	275,000
Compressive Strength (psi)	750,000
Modulus of Elasticity (psi) (Deflection)	95,000,000
Co-efficient of Thermal Expansion (per ° F.)	3.00×10^{-6}
Torsion Strength (Shearing Stress psi)	125,000
Tensile Strength (psi)	150,000
Impact Strength, Ft. Lbs. (½" Square Specimens)	9.5

● What kind of rolls do mills use today for producing paper-thin strip and many other gauges with ultra-mirror finish? The answer—Talide Tungsten Carbide Rolls. Carbide material has many inherent advantages, principally the characteristic of taking and holding a mirror-like finish which is imparted to the metal rolled. This advantage, plus many others, makes these work rolls the magic wand (as more and more mills are proving), for such items as cold rolled, copper, brass, stainless, spring steel, razor steel, alloys, carbon, aluminum, aluminum foil, tinsel ribbon and flat wire. Don't overlook the long life—the ratio of roll grinds for carbide rolls to conventional rolls is usually 25 to 1.

Send today for Catalog CR-50.



SLEEVED ROLLS FOR FLAT WIRE



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METAL CARBIDES CORPORATION
MC TALIDE
YOUNGSTOWN, OHIO
HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION

YOUNGSTOWN 7, OHIO *Pioneers in Tungsten Carbide Metallurgy*

CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS

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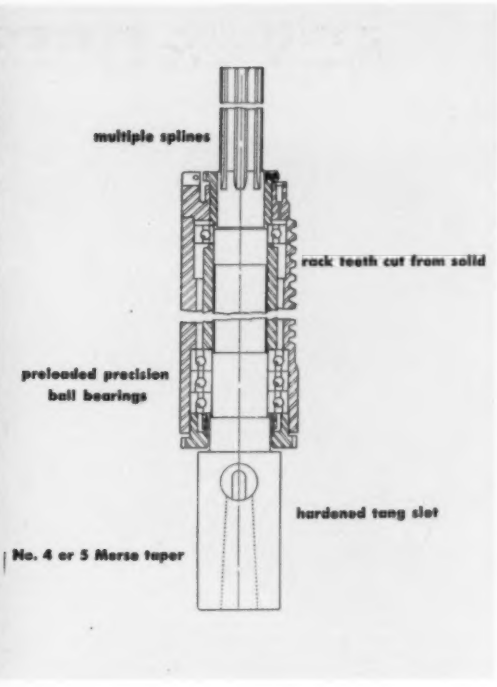

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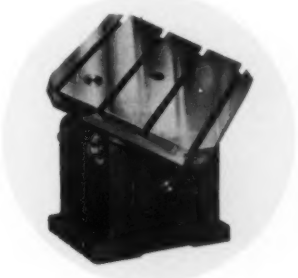

- RADIALS
- HORIZONTAL BORING MILLS
- ACCESSORIES

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